STEM Faculty Learning Community

College of Natural Sciences and Mathematics

F13 Cohort Final Report

Table of Contents

REPORT SUMMARY AND FACULTY SURVEY & RESULTS

THE STEM FACULTY LEARNING COMMUNITY IN THE CNSM	3
POST FLC SURVEY ANALYSIS	4
BRIEF SUMMARY OF FACULTY REPORTS	7
REVISED FACULTY SURVEY	9

FACULTY REPORTS

Dr. Crass: Math 122	11
Dr. Pace: Biol 213	12
Dr. Papp: Phys 151 Lab.	19
Dr. Rourke: Biol 207 & Biol 342	22
Dr. Schwans: Chem 322B	34
Dr. Stankowich: Biol 312	38
Dr. Ziemer: Math 115	42

Faculty Learning Community F13 Cohort Second Semester Report: Effecting Change

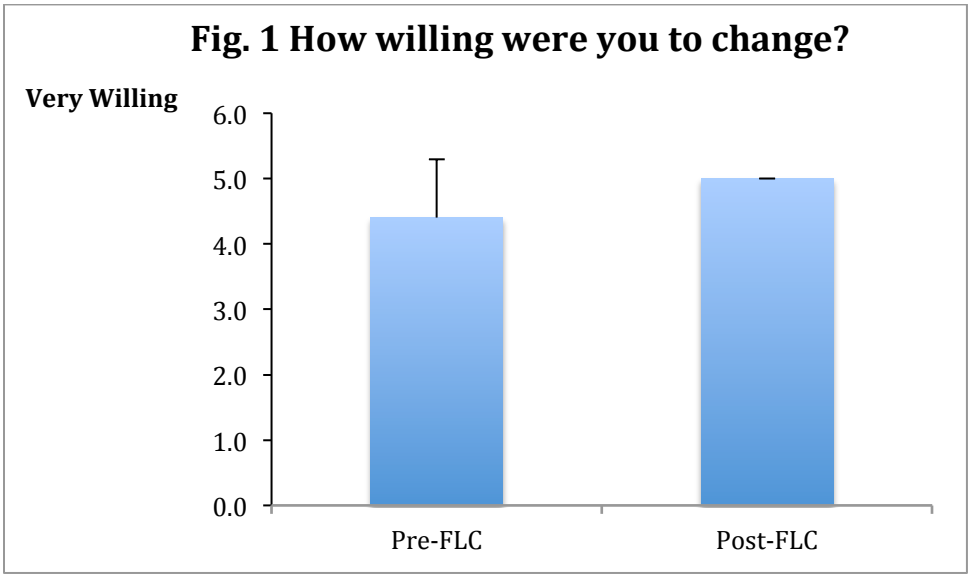
The Fall 2013 semester of the College of Natural Science and Mathematics Faculty Learning Community (FLC) brought with it new faces, discussions, issues and solutions from all departments in the college except science education. We initially had 8 members, but Dr. Behl from Geological Sciences became too busy to continue and removed himself from the group midway through the Fall semester. Faculty members participated in a similar online component as was developed in previous semesters. Modifications to the FLC modules were made by me based on S13 results when I was a Co-leader with Dr. Chang. The main change was that the module on "life work balance" that had been added in S13 was removed due to our perception that faculty were too busy at the end of the semester to take it seriously. The overall goal of the FLC remained the same: to encourage faculty to make sustainable changes in their teaching, and to foster a culture of teaching excellence throughout the college.

This cohort was a little more challenging than some of our early participants and they were a little slower than some past cohorts to get going in the discussions for module one on "student's today". It seemed like some of the more junior faculty (Drs. Pace & Stankowich from Biological Sciences and Dr. Schwans from Chemistry & Biochemistry) were asking most of the questions (a good sign!), but some of the more senior faculty were less participatory. I was happy to see that the more senior faculty got on board after some encouragement from me and discussions improved as the semester went on. Everyone participated in modules 2 and 3 on "assessment and reverse design" and "ways of engaging students". The discussion of our last module on "active learning" was a bit more subdued, but Dr. Crass who had more experience than most of the others with these approaches provided some nice insights for the group.

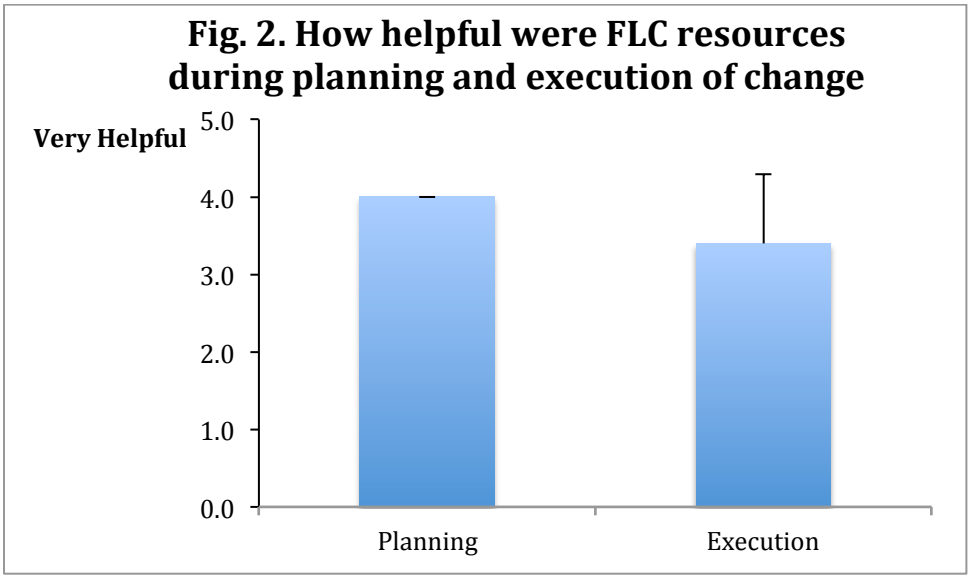
Overall, the University's and Dean Kingsford's continued investment in STEM education and the CNSM FLC continues to be highly successful. Faculty participants were as always provided with the tools needed to bring new and innovative approaches into their classrooms. The data presented below demonstrate that a STEM- focused FLC makes a difference to faculty participants, that our faculty continue to be willing and eager to enact change, and that many of these diverse changes positively impacted student learning in CNSM classrooms.

POST FLC SURVEY ANALYSIS

This year we decided to introduce a revised version of the faculty feedback form (see pg. 8 below). After having used similar forms for previous cohorts, Drs. Young and Chang and myself decided to use new questions to try to assess the effectiveness of the FLC training and to quantify faculty attitudes about students and the experience. The first few questions were the same; however, and the results for the F13 cohort were similar to past offerings. Overall, faculty displayed very high levels of willingness to change their teaching practices to improve student learning both before and after participating in the FLC (Fig. 1, P>0.2).



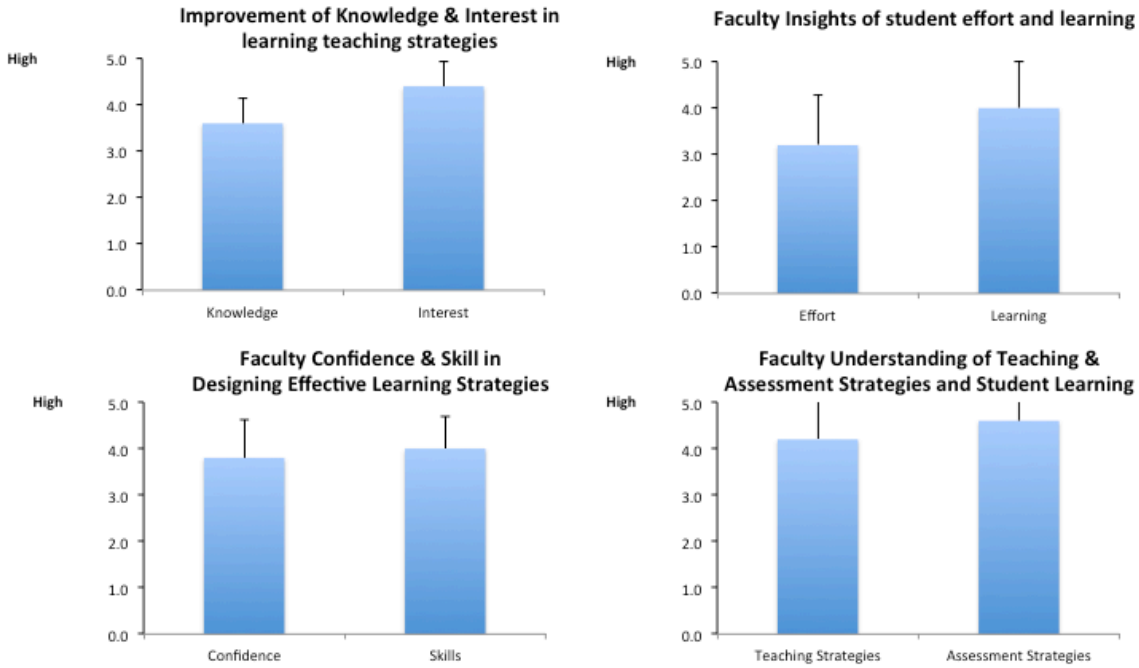
They also found the FLC materials helpful to plan and execute their changes. (Fig. 2, p>0.2).



The majority also indicated that this training was one of the first formal training exercises in teaching they had participated in with only one of the respondent faculty (5/7 responded) indicating they had more than TA training in their careers prior to the FLC. The faculty took advantage of the resources by accessing and then discussing the material on our FLC discussion board an average of 4 times during the Fall semester, and they expressed that the resources helped them learn some about alternative teaching strategies and that they got useful feedback on the discussion forum (avg. 3.8/5 on both questions). The faculty participants also generally agreed that they would consider backward design principles when planning classes in the future.
The major change we made in the faculty survey was in the questions relating to faculty perceptions of the extent of any gains or insights they obtained across a range of areas as a result of their FLC participation.

Major perceived gains were seen in almost all categories (Fig. 3) with the only exception (3.2/5) being more moderate views on how the FLC might change how students perceived them as instructors. Very high reported gains were seen in faculty interest in learning teaching strategies as well as designing, implementing and assessing those strategies for student learning. These are the central goal of the FLC, which is very gratifying.

Figure 3. Faculty Perceptions About Gains Made During the FLC



Future Prospects: One point for future change was the indication both in survey and comments made by more than one participating faculty member was that the FLC could benefit from additional in person meeting times during the "learning" semester. This is being enacted already by Dr. Prashanth Jaikumar, the leader for F14 cohort. One faculty

member also requested we implement demonstrations of active learning approaches. In the past, practical demonstrations have been incorporated into the luncheon meeting the FLC puts on once or twice each semester, but we could have a more formal mechanism during the training phase. I am also pleased to see that the use of FLC is expanding to other colleges at CSULB. Now that many faculty within our college have participated in the FLC, we are entering a more mature phase of the program. The current and past leaders have discussed having "reunion" meetings where we get past participants together to try to maintain a sense of community within the college and keep the pedagogical creativity flowing.

BRIEF SUMMARY OF FACULTY REPORTS

Dr. Crass introduced "flipped" class lectures and assignments via videos to his Math 122 Calculus I class. Overall, course Exam grades were not improved by this approach and lecture periods were less well attended since material was posted online. For those who did attend, Dr. Crass noted their increased engagement with the material. Future plans include continuing with flipped approaches making some changes to address these issues that arose the first time around.

Dr. Rourke recorded his lecture and posted them so that students could watch them. Due to technical difficulties in the Biol 207 classroom in HSCI, he was only able to record his Biol 342 lectures. However, he was able to post the 342 lectures and these were watched by 90% of students. 70% of students indicated a preference for video recordings compared to simple audio recordings. In addition, Dr. Rourke made the videos available to the Biol 207 students, and the videos were frequently watched by many in this course, due to the similar material covered (although 342 is at a higher level). Dr. Rourke indicates he will continue to video all of his courses in the future.

Dr. Papp, actually performed his intervention in Fall 2013, at the same time he participated in the learning semester. He radically changed the laboratories with the stated goal of making them all computational and introducing computer programming skills. About 50-60% of the course seemed to take to the computer programming requirements, while others struggled. Dr. Papp evaluated student attitudes about the changes, students replied positively regarding 4/6 of the survey questions with twice as many student s voting positively.

Dr. Schwans implemented a review "pre-test"administered at the beginning of class. Students who did poorly, were sent emails urging them to seek help or enroll in SI courses. Comparisons of performance on this pre-test vs. success in the course showed strong correlations in performance. However, many students who did poorly on the review were able to pass the class ultimately. This test seems to be a good early indicator to foster interventions to increase students success.

Dr. Pace used iClickers to give a brief quiz on material from the previous lecture. He also assessed the efficacy of his multiple choice questions using the parscore exam system, revealing improved student performance between exams 1 and 2. He also offered a pre- and post-survey on student performance and attitudes on the subject of physiology. Student performance increased appreciably indicating real student learning. For attitudes, a few questions showed increased confidence in abilities, etc. but others will be used to re-assess future course offerings.

Dr. Ziemer increased the use of iClickers in his business calculus class. Students responded favorably to these approaches. He also introduced primary literature reading assignments as well as increased time in class for student work in an upper division differential equations class. Both of these approaches were overwhelmingly approved of in student surveys.

Dr. Stankowich used videos to "flip" one of the most difficult modules in his course (identified in a past offering 2013) in evolutionary biology (Population Genetics & Quantitative Genetics). He provided background material via online video and then spent more in-class time over multiple class periods walking the students through the more challenging materials. Scores on a problem set assessing these topics were significantly higher with the new approaches, it also improved performance on relevant material on the next exam, although overall exam performance decreased due to other material. Significant improvements were also seen in most questions of a pre- and post-test on the material and anecdotal student attitudes were positive.

FLC Faculty Participation Survey:
We would greatly appreciate your feedback on your FLC experience. These data will only go to me and the FLC leadership, and we promise that ONLY the aggregate results (not individual answers associated with particular faculty) will be shared. Please circle (or X if you want to fill this in electronically) the number that best reflects your feelings. There are no "right" answers that we are looking for—and many of these data will just be used internally by us to make recommendations about the scope and organization of future FLCs. The closer the number is to the item/adjective, the more you feel that way.

1. How willing were you to engage in trying something new to improve student learning in your classes **when you started** the FLC in F13?

Very willing 5 4 3 2 1 Not willing

2. How willing were you to try something new to improve student learning in your class(es) **when you started** your class during the S14 semester?

Very willing 5 4 3 2 1 Not willing

3. How helpful were the resources from the online FLC to you **as you planned** your S14 course change?

Very helpful 5 4 3 2 1 Not helpful

4. How helpful were the resources from the online FLC to you **as you executed** your course change during the S14 semester?

Very helpful 5 4 3 2 1 Not helpful

5. How many times did you **participate** in the online FLC discussions?

0 1 2 3 4 5 >5 Postings

6. How much training in teaching did you receive **prior** to the FLC? **(mark all that apply)**

a. Additional degree/credential in education
b. Multiple courses/workshops on university-level teaching
c. Several courses/workshops on university-level teaching
d. Training to be a TA during graduate school or post-doctoral fellowship
e. No formal training

7. The FLC experience would have benefited from **more** in person meetings.

Strongly Agree 5 4 3 2 1 Strongly Disagree

8. I learned a good deal about alternative teaching strategies during the FLC.

Strongly Agree 5 4 3 2 1 Strongly Disagree

9. I plan to consider modes of assessment when revising/developing courses (e.g. backwards design) in the future.

Strongly Agree 5 4 3 2 1 Strongly Disagree

10. I received useful feedback on my teaching from my FLC peers and staff.

Strongly Agree 5 4 3 2 1 Strongly Disagree

Using the scale below, please indicate your perceptions of the extent of any gains or insights you obtained in the following areas as a result of your FLC participation. Place your answer in the blanks at right.

a great deal	**a lot**	**somewhat**	**a little**	**Not at all**
5	**4**	**3**	**2**	**1**

11. Your **knowledge** of different teaching strategies to help students learn ____

12. Your **interest** in learning new strategies to teach effectively ____

13. Your view of how hard your students were **trying** to learn ____

14. Your view of how much your students were **learning** ____

15. Your perception of how students **viewed** you as an instructor ____

16. Your **confidence level** in designing/implementing effective learning strategies for your class ____

17. Your **skill level** in designing/implementing novel teaching strategies ____

18. Your understanding of the relationship between your **teaching strategies** and student learning ____

19. Your understanding of the relationship between your **assessment strategies** and student learning ____

20. Please provide any other suggestions or feedback to help us improve the program for future FLC classes.

Flipping Calculus 1
Scott Crass

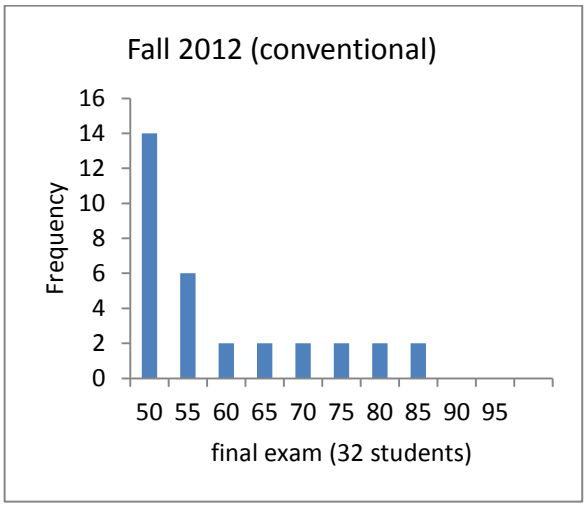
I introduced a flipped format in a Calculus 1 course. The structure was as follows:

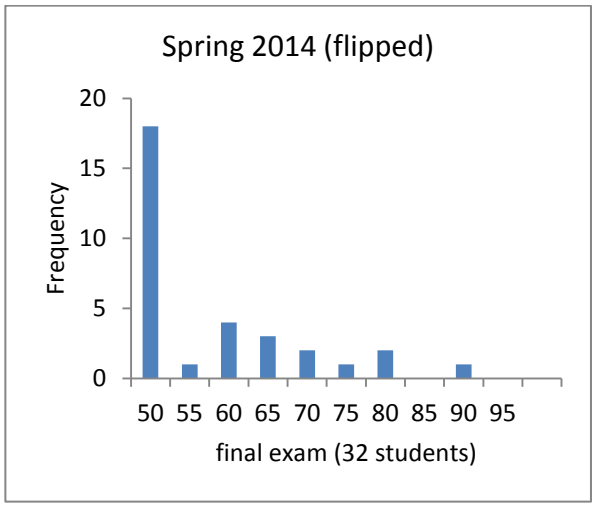
- Video lectures and tutorials posted to the class website (www.csulb.edu/~scrass/teaching/math122); to be viewed prior to class

- Class sessions devoted to
  1) addressing questions/clarifications from videos,
  2) group work on WebAssign (WA) exercises,
  3) bi-weekly WA quiz
  4) comparative assessment: in-class exams that are comparable to exams from a previous, more traditional run of the course (results summarizes below).

Outcome and response

The exam results for the flipped class were somewhat less favorable than for a previous course taught conventionally, but likely are within the range of statistical fluctuation. As for class sessions devoted to exercises, I was most encouraged by the level of engagement among the students who attended (however, by the end of the semester, attendance was only about 50%). The most disappointing outcome was the scarcity of questions raised in class in response to video and assigned material. One factor accounting for the lack of inquiry (and low attendance) could be the high degree of independent effort required. Students have the freedom not to watch critically or not to watch altogether the lecture and tutorial material. There might also be a technological reason: the online resources available through WA that students can utilize in forming responses to exercises. That said, a large number of assigned exercises didn't appear on WA—a circumstance that I noted frequently—and there were very few questions, if any, asked about these items. In fact, the class was told that the non-WA exercises were candidates for inclusion on exams. I plan to address this issue directly next semester by 1) emphasizing the importance of watching the lectures in a critical fashion and 2) dedicating the activity sessions to the non-WA exercises.





CNSM Faculty Learning Commnity Final Report

Introduction

Douglas Pace
Biological Sciences
BIOL 213
110 students

This was the first time I taught BIOL 213 – Ecology and Physiology and I only taught for half of a semester (the physiology portion). Therefore I did not have previous performance evaluations to use as a comparative tool (grade distributions or student evaluations from previous times I taught the course). I felt that the changes I should implement as part of my FLC experience should be focused on strategies that can be evaluated within the time interval I was teaching. Being new at CSULB and being a lecturer with relatively less experience, I decided a comprehensive assessment strategy would be the most effective use of my time and provide me with actionable information for increasing my effectiveness as an educator in future classes. I took a multi-pronged assessment approach. This allowed me to acquire valuable metrics of student interest and performance as well as metrics related to my own ability to teach and evaluate the students.

Hypothesis

Employing a combinatorial assessment strategy aimed at both students and myself, I would be able to determine 1) how effective I was at teaching them physiology and making them aware of its importance and 2) how effective I was at evaluating their performance on exams.

The major assessment strategies I pursued were:

1. Formative assessment of students using iClicker quizzes.
2. Assessment of exam construction using correlation analysis of performance on different exam sections and ParScore analysis of the multiple choice section.
3. Attitudinal surveys to assess changes in how the students perceive the subject of organismal physiology.
4. Entry and Exit quizzes to assess the base knowledge of the students upon starting and leaving the course.
5. Student assessment on the quality of on-line lectures they were provided with in preparation of future class-flipping exercises.

Results and Discussion

<u>1. Formative assessment with iClicker quizzes.</u>

This is the first time that I taught Biol 213, so there is no standard by which to compare how effective this was. I would start each class off with a 5-question quiz that was focused on the material from the previous lecture. Questions ranged from specifics about a physiological process to more broad level concepts. These quizzes

also served the purpose of taking attendance. It is my belief that these quizzes were productive because it forced students to begin assimilating the lecture material very quickly, rather than not doing anything until just before an exam. In this way the lecture material was reinforced by motivating the students to look at the material again in preparation for the quiz.

2. Assessment of exam construction using correlation analysis of performance on different exam sections and ParScore analysis of the multiple choice section.

In a perfect world, I would give only essay and short-answer exams, but this I not possible. Therefore my exams were a compromise with about 50% of the exam being multiple choice (MC) and the other half being free-response (FR). The multiple choice portion of the exam was graded and analyzed using the ParScore system, allowing me assess the quality of the MC questions. Interestingly, for the first exam I relied more heavily on questions provided by the text book (Sadava – Life the Science of Biology). I was rather disappointed in the students overall performance on the MC section. Therefore on the second exam I created the majority of MC questions myself. I then assessed the differences in student performance and post-exam metrics to determine the quality of the exam construction. The students' performance was much better for the second exam (Fig. 1A) and so were the ParScore metrics of Point Biserial (correlation between each student's correct response to a question and their overall exam performance) as well as the KR20 Reliability Coefficient (Fig. 1B) for the entire exam. These assessments were very insightful for me. Given the amount of information provided, I will continue to employ ParScore analysis for all MC exams. As for the development of MC questions, while it is far easier to rely on the publisher-provided question-bank for MC exams, it is clear that this does not benefits the students. Given the nuances of teaching styles and teacher-specific points of emphasis, it is apparent that students benefit (at least in my class) from questions that I specifically design.

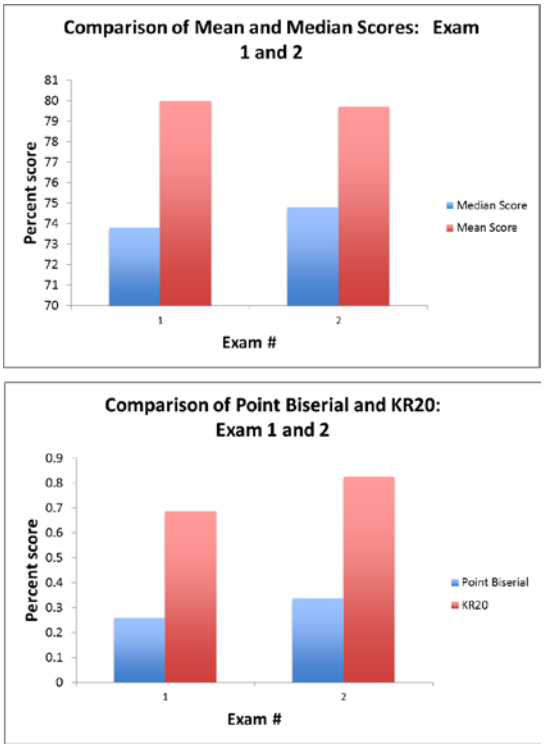


Figure 1. Comparison of multiple choice sections for Exams 1 and 2. (A) median (blue) and mean (red) scores. (B) Point Biserial (blue) and KR20 (red) scores.

I also wanted to assess the large-scale structure of the exams I designed for the Biol 213 students. I decided to not rely solely on MC exams, but to offer the students another format by which to demonstrate their knowledge of the subject material. Therefore exams were about 50/50 of multiple choice (MC) and Free Response (FR). The free response questions were short answer, matching, fill-in-

the-blank, and drawing diagrams. The purpose of adding the free response questions was to allow students the freedom of demonstrating their knowledge in ways that didn't rely on the multiple choice format. The short answer format was emphasized so as to allow students to "tell me what they knew" about a given subject.

The general feedback regarding the free response questions was particularly interesting. After giving the first exam, I asked, "What part of the exam do you feel more confident about: A) multiple choice, B) Free Response." The results were a 50/50 tie between the 2 choices (49 students each). My general impression was that many of the students were simply not used to having free response exams and were uncomfortable with such an experience. However, the students that had a better handle on the material were more comfortable with the free response. I then assessed the correlation between multiple choice and free response performance for each of the 2 exams. The correlation between MC and FR performance was significant (ANOVA: N = 1, 105; P < 0.001 for both exams: r^2 = 0.47 and 0.57, for Exams 1 and 2). The slope of the relationship for Exam 1 was 0.94 (+/- 0.09), meaning that for any given percentage point performance on multiple choice, a student was likely to receive a similar percentage performance on the free response

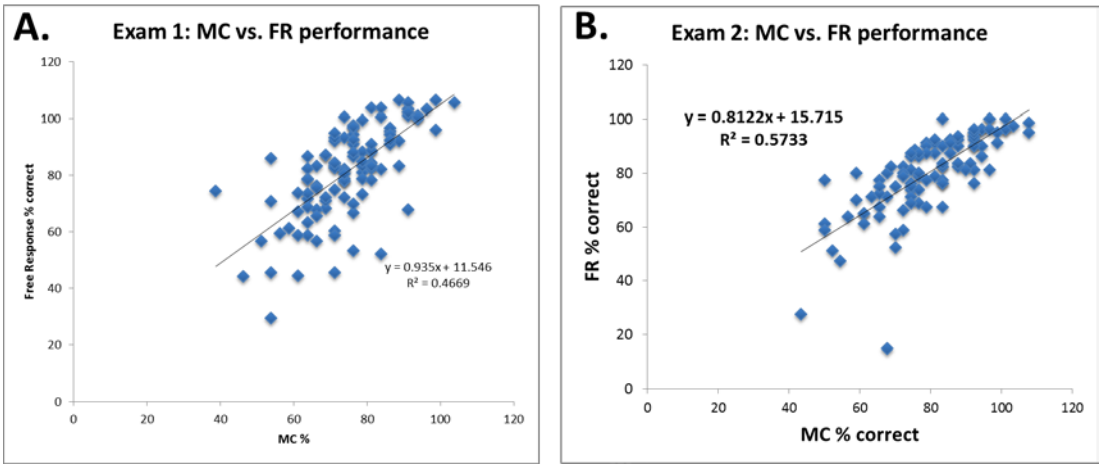


Figure 2. *Correlation between Multiple Choice and Free Response scores on Exams 1 and 2. Scores are given as percent correct for each section. For both exams there was a significant correlation between MC and FR performance.*

section. For Exam 2 the slope was 0.81 (+/- 0.07). This means that students generally did a little better on the MC questions than the FR questions. This is probably because for Exam 1 the FR questions were all designed by me while the MC were not. On Exam 2, all MC and FR questions were designed by me, therefore there was a relative increase in performance on the MC for Exam 2 (as explained in the previous section, see Fig. 1). Overall, the analysis demonstrates the reliability of the free response questions to correlate with the knowledge base that is being evaluated on the MC portion of the exams. This kind of combination exam therefore allows students 2 very different formats by which to demonstrate their knowledge. However, this testing strategy places a lot of work on grading and may not be tenable for large classes where there is no extra help in grading.

On a side note, this correlational analysis also provides information for identifying students who are either 1) having difficulty in taking exams and may require DSS intervention, or 2) students who are potentially cheating. Students that fall far off the regression curve (high MC score and low FR score) may in fact need to take the exam at the DSS center with more time. It is also possible some students may be cheating by copying the MC responses from a neighbor, but due to their inability to effectively copy the FR answers they do much worse on that section then the MC. While this analysis can prove nothing definitively, it does at least bring these potential situations to my attention.

3. Attitudinal surveys to assess changes in how the students perceive the subject of organismal physiology.

As a way to assess the students' view of the course material and how it evolved during the class, I administered an attitudinal survey on the first and last days of the class. Questions for the attitudinal survey (Table 1) were designed to understand what the students thought about the subject of physiology, its importance in their personal lives, and its importance in their professional/academic lives. These questions were developed in conjunction with Susan Gomez Zwiep in the Science Education Department. The intention was to see if taking BIOL 213 would significantly change the way students relate to physiology. Results of the survey (Fig. 3) show a mostly positive view of physiology with the lowest average response

Response options:	1 = Strongly disagree 2 = Disagree 3 = Agree 4 = Strongly Agree 5 = Not applicable
Question #	**Question**
1	If asked, I could give a simple but clear definition of what physiology is.
2	Whenever I am unfortunate enough to get sick (cold, flu, etc.) I am interested in knowing what is going on inside me that makes me feel so bad.
3	I take interest in news stories about health-related topics.
4	I take interest in news stories about breakthroughs in disease research.
5	I make attempts to understand my own physiology so that I can lead a healthier life style.
6	I am looking forward to taking more physiology courses in the future.
7	I feel confident that I can do well in the physiology portion of Biol 213.
8	The combination of lectures, chapter readings, video links and lab exercises provide the necessary information for me to do well in the physiology portion of Biol 213.
9	I believe the material I learn in the physiology portion of Biol 213 will help me be a better student of biological sciences.
10	I believe the material I learn in the physiology portion of Biol 213 will help me in my future career changes and opportunities.

Table 1. Response options and questions for Attitudinal Survey. Survey was given to students as an iClicker survey on the first and last day of classes. Sample size for each survey was ~ 100 students.

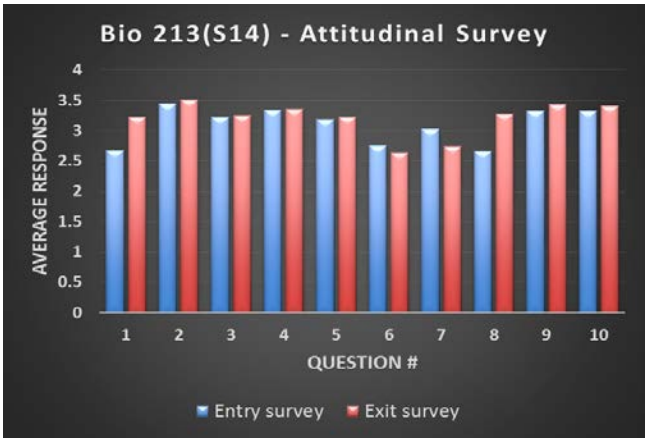


Figure 3. Results of Attudinal Suvery for Biol 213 (Spring 2014). Questions and response options are given in Table 1. Blue bars represent results for Entry survey and red bars are for the exit survey. Sample size for each survey was ~ 100 students.

being for Q#6 ("I am looking forward to taking more physiology courses in the future"), with average responses of 2.75 and 2.63 for entry and exit, respectively, meaning there was a slight agreement with the statement (see Table 1 for response options to survey). Question 7 ("I feel confident that I can do well in the physiology portion of Biol 213") also showed a decreased agreement from entry to exit survey (from an average response of 3.02 to 2.73), but was still in the positive range. This information will be very important for teaching future classes as it gives me actionable data to address. It will now be a primary focus for me to find ways to build confidence in the students while learning the material so that in future classes these questions will have a more positive average response. Questions #1 and #8 had the largest increase from entry to exit surveys ("If asked, I could give a simple but clear definition of what physiology is" and "The combination of lectures, chapter readings, video links and lab exercises provide the necessary information for me to do well in the physiology portion of Biol 213"). This was encouraging in that it is very typical for students to be confused by the highly integrative nature of physiology and therefore not know how to confidently define what it is. Q#8 is encouraging because it demonstrates that the teaching strategies are good enough to convince the students that their understanding of the material is not limited by the teaching materials, but more so by their individual efforts. This question will always be an important internal assessment for me to know that the students feel they are getting the resources they require to do well. If not, then I will make this a top priority. Overall, I feel the attitudinal survey was very powerful in showing me where the students started and how their attitudes changed, or not, as a result of taking the course. General observations shows that the students come in to the class with a fairly strong interest level in physiology and are cognizant of its importance in biology (see questions 2, 3, 4, 9, 10). As an educator, I hope to be able to take these already positive views and find ways to make them even more positive as a result of taking Biol 213 or any other physiology class.

<u>6. Entry and Exit quizzes to assess the base knowledge of the students upon starting and leaving the course.</u>

In conjunction with the attitudinal surveys, entry and exit quizzes were given to test the general physiology knowledge base of the students. The questions were multiple choice and given as an iClicker quizzes (Table 2). The questions asked ranged from general principles of physiology (homeostasis and osmosis) to organ systems and finally to more specific details pertaining to physiological systems, functions, and pathologies. The results are given in Figure 4. It was encouraging to see that for the background questions (1 and 2) students did quite well. Equally encouraging was that for most questions that had relatively poor performance for the Entry quiz, there was marked improvement on the Exit quiz. Unfortunately, question #8 had very poor results even for the exit quiz ("The primary function of the kidneys is to:"). This is very informative for me since most students confused the function of the kidney with that of the liver. Overall performance of the quiz (Fig. 4B) was positive in that the average percent correct went from a 60.9% up to a 79.6%. This quiz delivered actionable information and I can now specifically

address areas of concern for future classes (e.g., confusion regarding kidney and liver function).

Question #	Question
1	Homeostasis is:
2	The word osmosis refers to:
3	Nerve cells (neurons) send signals to other parts of the body by way of:
4	Endocrine glands release _____ into the circulatory system, which are used to enact changes in a different part of the body
5	The hearts of birds and mammals are composed of how many distinct chambers?
6	A nurse determines a patient's blood pressure to be 125/83 (said "125 over 83"). What is that patient's diastolic pressure?
7	(Following from Q#6): The patient is a male, age 65. Does this patient suffer from high blood pressure?
8	The primary function of the kidneys is to:
9	Patients who exhibit a significant loss of insulin sensitivity (cells no longer respond to insulin) suffer from:
10	Most of the digestion of food takes place in what part of the human body:

Table 2. *Questions used for Entry and Exit Quizzes to test general knowledge of physiology for Biol 213 students.*

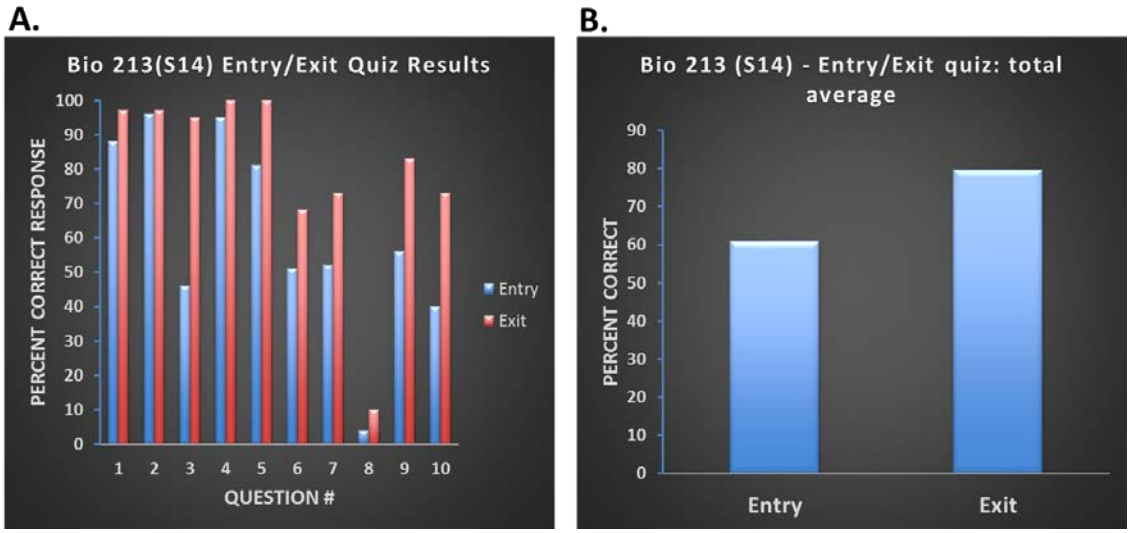


Figure 4. Results of Entry/Exit Quiz of general physiology knowledge. (A) Results for individual questions (1-10, see Table 2 for questions). (B) Results showing average performance of class for Entry and Exit quizzes.

<u>6. Developed on-line lectures for students to test their willingness to learn material through this format.</u>

During the semester, I delivered a small amount of lecture material by recording them online and posting them to Beachboard using the Panopto system. In total I delivered 1 complete lecture (respiratory physiology) and 2 half lectures (blood circulation and reproductive physiology). I took several opportunities to get

feedback from the students on how effective they felt the online lectures were relative to in-class lectures (Figure 5). A large majority of students said they liked the online lectures since they could watch it several times and go back to it when they were studying. This was a useful experience for me because it is my intention in future classes to "flip" the material so that students learn the lecture material through online lectures in their own time and then use the vital class time (i.e., contact time with me) to implement the knowledge gained and go over specific areas of confusion. Before doing this I wanted to assess my ability to deliver complex physiology lectures through recorded powerpoint presentations that would be available through Beachboard. As Figure 5 demonstrates the results were quite positive and this will enable me to continue developing more "flipped" subject material for future classes.

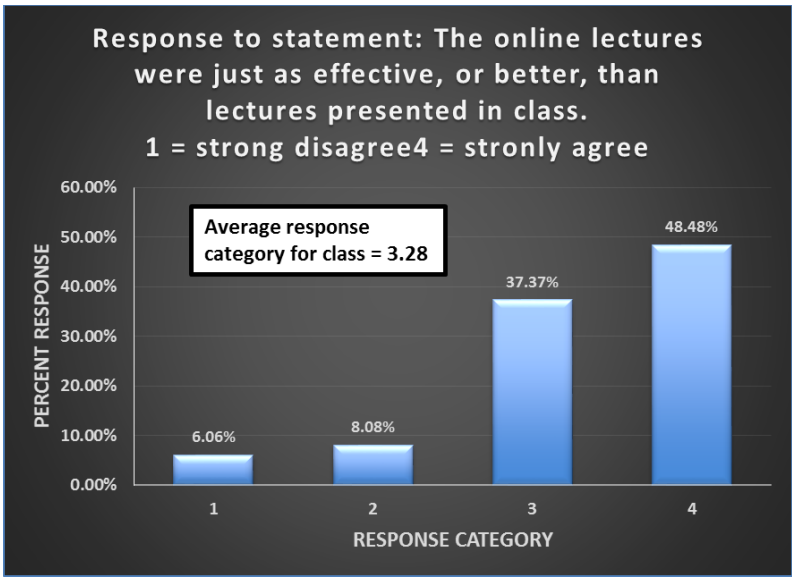


Figure 5. Student assessment of online lecture quality compared against the in-class lectures. Sample size = 99 students.

Conclusions

The results of the various assessments were mostly positive and will certainly influence my teaching and test-making strategies for all future classes not just Biol 213. I will continue to use all of the assessment strategies summarized above, as this will give the necessary information regarding the quality of my teaching strategies and their effectiveness in enhancing student performance and outlook. Importantly, I will begin to add more material to on-line lectures and use the open lecture time to engage the students in more creative ways by which to teach the material. I think "flipping" strategies will lend themselves very nicely to the concepts of physiology. Their integrative and complex nature requires a more open environment (i.e. less rigid lecture structure) by which to address individual questions and points of confusion.

Report for the Faculty Learning Community

Dr. Zoltan Papp

Class taught: Fall 2013 Phys 151 lab, with the help of faculty volunteer Dr. Robert Woodhouse and student Graduate Assistant Natalie Brown.

The motivation of the change:

Teach the fundamental concepts of physics by furthering algorithmic thinking.
I strongly believe that we should concentrate on basic concepts and the method and the way to get results are much more important than the result itself.

Instructional change:

I taught calculus based introductory physics (Phys 151 & 152) lecture classes many times. I was always frustrated by the fact that there was no correlation between lab grades and the performance in the class. The current 151 lab had two computational exercises that were not well integrated into the conduct of the lab. The other lab exercises were taught traditionally but had many aspects that made them challenging for students to understand physics concepts. A computational approach to learning physics has a large body of work supportive of such an approach and promotes many desirable skills for students including problem solving, critical thinking and algorithmic literacy.

As I was assigned to teach one section of 151 lab class I introduced the following changes:

1. All the lab experiments were designated to be computational experiments. The only tools used were the programing language VPython and the Vidle environment that was available on all the lab computers as free softwares.
2. In the first 2-3 labs we introduced the VPython programing language. This language has been designed for use by the authors of the book we are using “Matter & Interaction” (Chabay and Sherwood). We also taught how to write effective, concise and short lab reports.
3. Using very simple examples (~40 lines of code) we showed how to simulate physical phenomena by using the basic principles of physics as taught in the class.
4. Then we gave in-class assignments targeting specific basic physical quantities. Here the students had to gradually modify codes, build in the relevant physical quantities, produce outputs in terms of data and images, capture and insert them in the report, and finally write their own conclusion. Lab reports were simple and straightforward enough that they could be produced in class by the end of the lab period.

Challenges:

Challenges included introducing simple programming techniques to students in a very short time. Simultaneously, we needed to keep students from moving to a code centric perspective and keep them focused on the physics.

Student reaction:

We experience mixed reactions from students. At the beginning they were frustrated that we did not provide the usual very detailed step-by-step instructions that students have come to expect in a physics lab. Rather we tried to push them to find out for themselves the formulae and procedures required to create examples of physics processes by the development of simple codes (using the physics book and their class notes). Initially, most students struggled with the idea of coding. It was clear that they had no or very limited experience with coding. It was a bit amazing to us that students who are in technology oriented majors had so little knowledge about a technology that will be crucial to their future in school and careers. During the semester most students became sufficiently adept at coding that they could concentrate on the physics.

Results:

Results are antidotal at this point. About 10-20% of the class clearly understood the approach (coding) and understood the physics. Another 40-50 % of class appeared to understand the approach (coding) and did “reasonable” at carrying out the lab work. Their physics understanding was mixed.The rest of the students (30%) struggled with the approach (coding) and the physics. But near the end of the semester some of these students started to understand the approach (coding) and started to understand the physics.

Lessons and considerations:

We need to improve ways to get student involvement in learning the concepts of physics by writing algorithm. We need to use computational approaches with other techniques and combine actual measurements with computational simulations. There still needs to be further synchronization with lecture. We would like to set up professional ways of determining the effectiveness of this approach and consider the effect of the early introduction of computation on the whole curriculum.

Future activity:

I reported our experiences in a department colloquium on early February 2014. There were quite a vivid discussion. In general, the faculty and TA's liked the approach. We are sufficiently encouraged by the results to continue with a computational approach to the 151 lab and extend it to the follow on 152 lab class. This summer both the 151 and 152 labs will be taught from a computational perspective.

CNSM Faculty Learning Community Final Report

Bryan Rourke
Biological Sciences
Biology 207 and Biology 342
160 and 75 students

Is this typically considered a low completion rate course? Bio 342 has a 5-10% withdrawal rate; most students will not continue unless they are C or above. Bio 207 has about a 10% fail rate, but C passing is 60% and above, D therefore is 50%. For whatever reason Bio 207 students (Nursing, Kinesiology, Exercise Science, and Nutrition) do not withdraw. They just take the D or F.

Planned Changes

I initially wanted to record a 30 minute lecture to augment the normal lecture material in Biology 207, a large non-majors class. I would have posted a narrated PowerPoint lecture made in PanOpto, available for the students to view anytime on BeachBoard. As I was preparing to implement that lecture, I noticed that the lecture hall I taught in seemed to be equipped with a video recording system (HSCI 102). I whimsically asked the class if they would watch a video of lectures if they were made available. Every single hand went up in class, and I spent the next month trying to access the AV features of the room to video record simultaneously the instructor and the slide presentation.

Implementation of Changes

While an elaborate system exists in that room, it is awkward to use for several reasons. The podium computer is the only one which can control the video capture, which tracks the instructor via a fob worn on the person. This was not common knowledge to the instructor or the Biology staff; AV services were also slow to address this knowledge. It took several weeks to get a fob tracked down and to activate the system. Sadly after all that, the tracking hardware was malfunctioning and I was never able to video record myself in HSCI 102. As I teach Biology 342 and 10-15 students audio record each lecture I tried video recording myself in HSCI 105 instead. I had to use my laptop webcam for video, as there is no built-in video capture in the smaller rooms. Other than the off-center recording (I placed my laptop no a chair to one side and aimed it me / the screen) – it worked surprisingly well. I made four full-length lecture videos of class, and while they were posted under the Biology 207 class website since PanOpto was originally activated on that site, I made the web link available to both classes.

The videos were accessed by the overwhelming majority (90%) of the Biology 342 class; although they were not really intended for the 207 students anymore, being material for majors at a higher rigor, many 207 students watched them anyway.

Assessment of Effectiveness

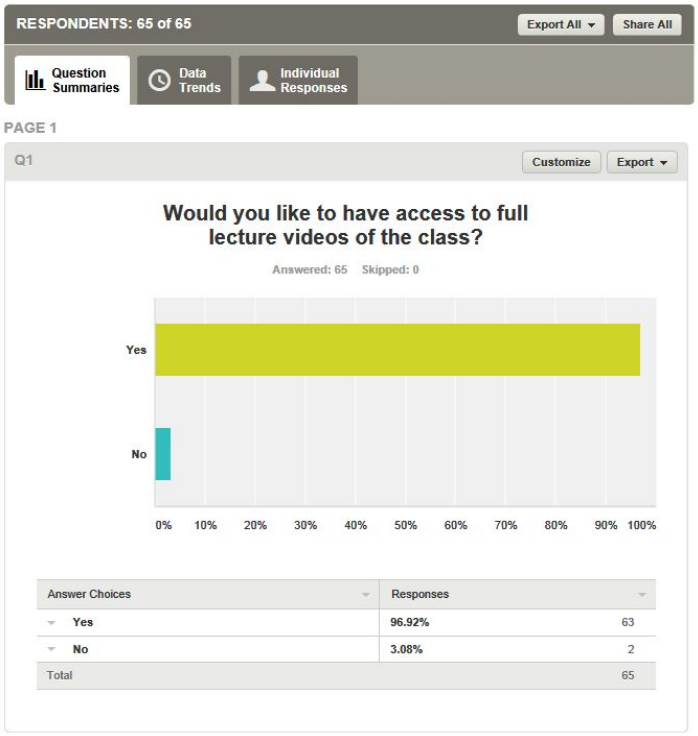
I surveyed the Bio 342 class regarding the videos. The videos were desired by 97% of the students, and accessed by 90%. Many students have a routine of audio recording lectures and listening to them, but nearly 70% of the students preferred to have the PanOpto combination of instructor video, PowerPoint slides, and narration. Drawbacks, as expected, were that the slapdash method of balancing my laptop on a backpack on a chair to the side was not optimal. Small lecture rooms should have a video recording system, even a GoPro camera at $199 could be used. Student comments from 342 are included in full at the end of the report.

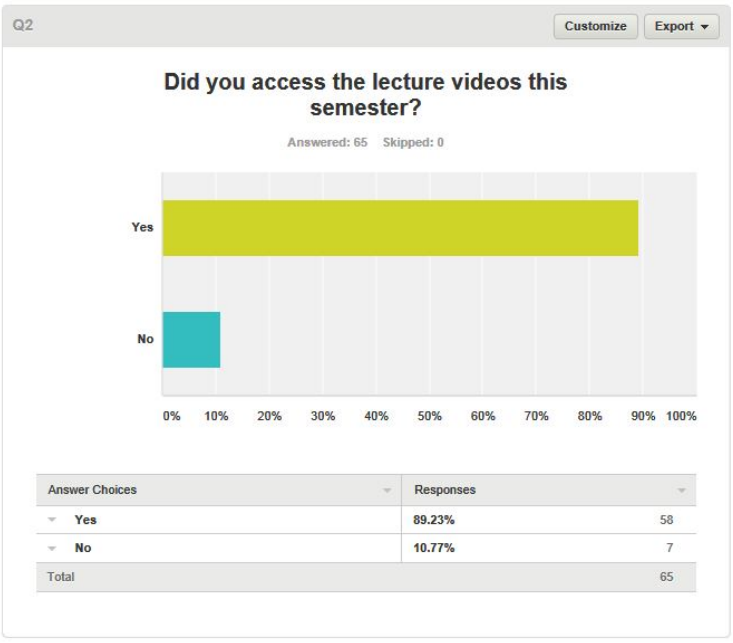
As the web link was disseminated, it was not always possible to tell which students were watching the videos, but unique visitors can be identified, and the amount of time they watch the videos is logged. The videos were watched frequently before the 3rd lecture exams, and then not much after that. Some students would watch 50-60 minutes of

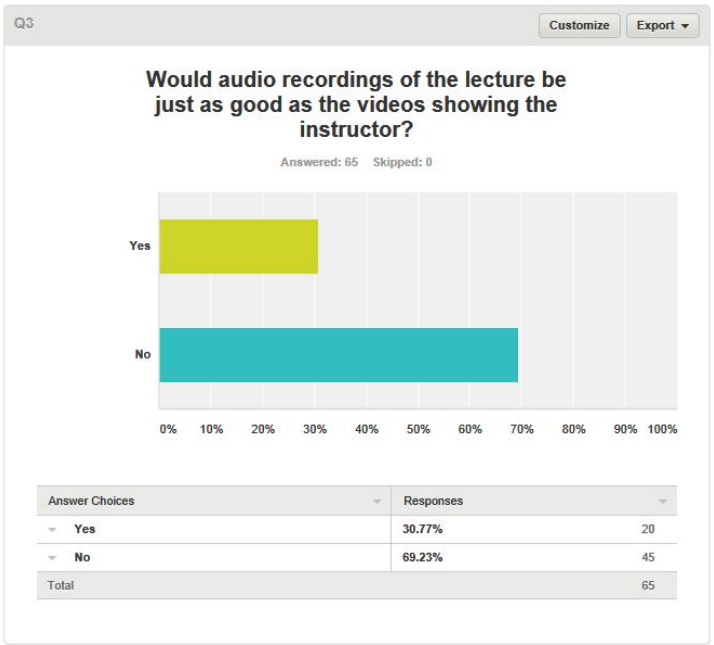
the entire video multiple times, and many students viewed the whole lecture at least once. Many other students may have watched only 10-20 minutes, or less even. Some just wanted to check out the quality, others could jump to certain sections of interest.

I plan to record all of my lectures in the future, in all of my classes. I would like to see scaled down video recording capabilities in all HSCI rooms; the implementation need not be expensive at all. I believe nearly every student would use the videos in all of my classes, as my surveys bear out.

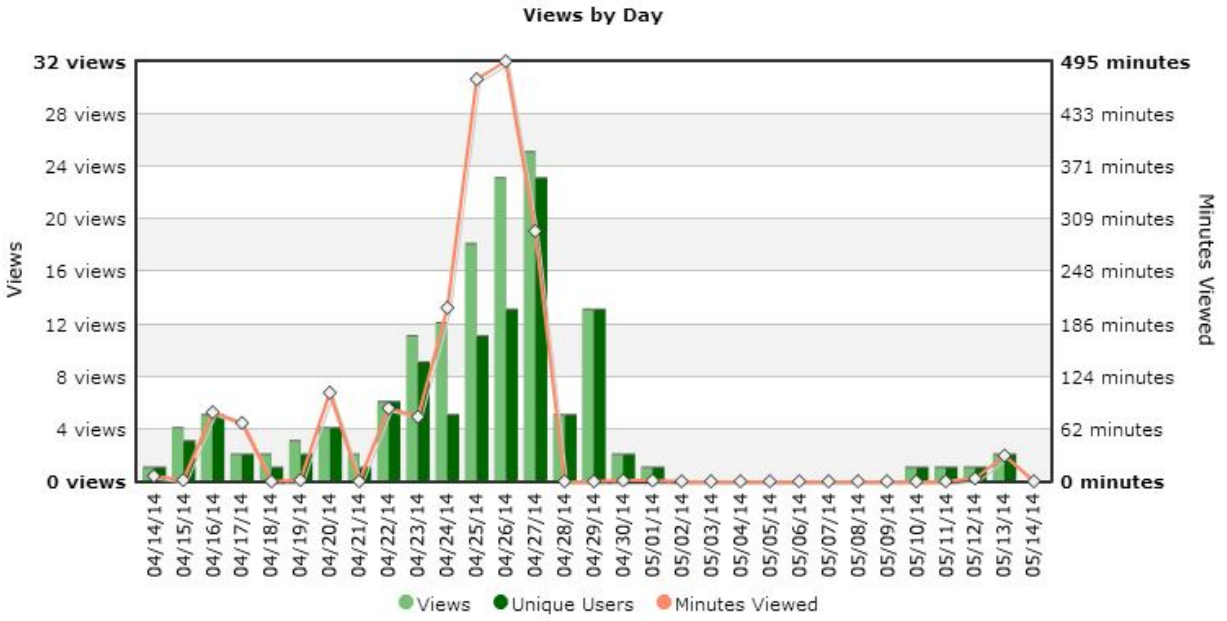
Survey Results



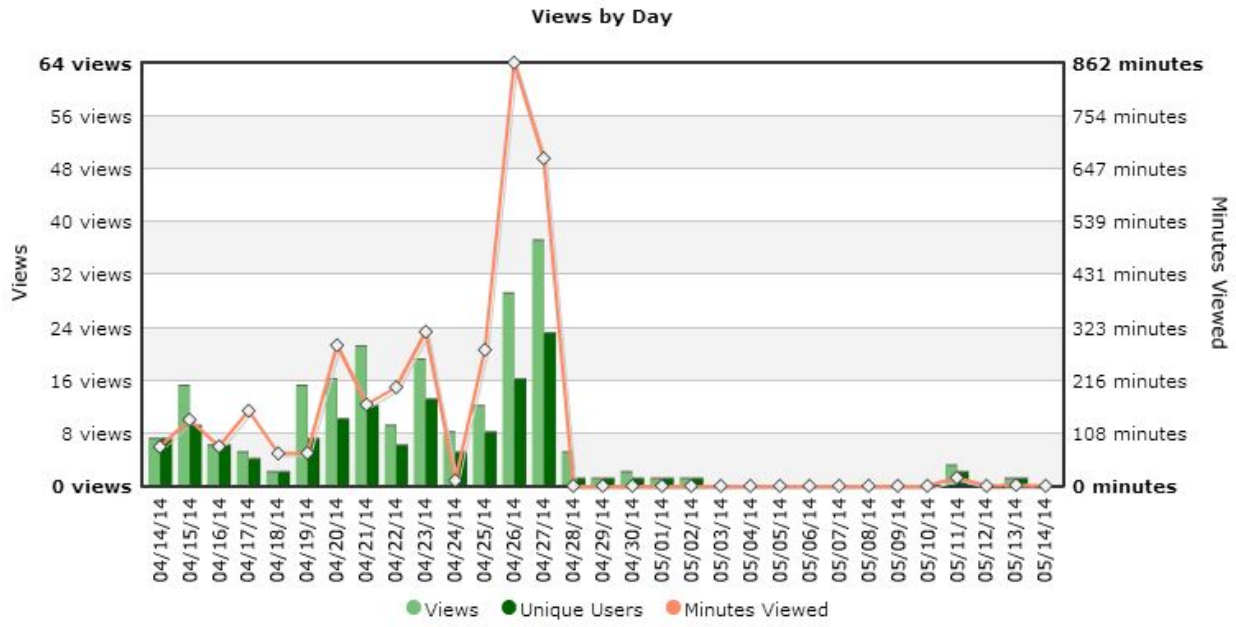




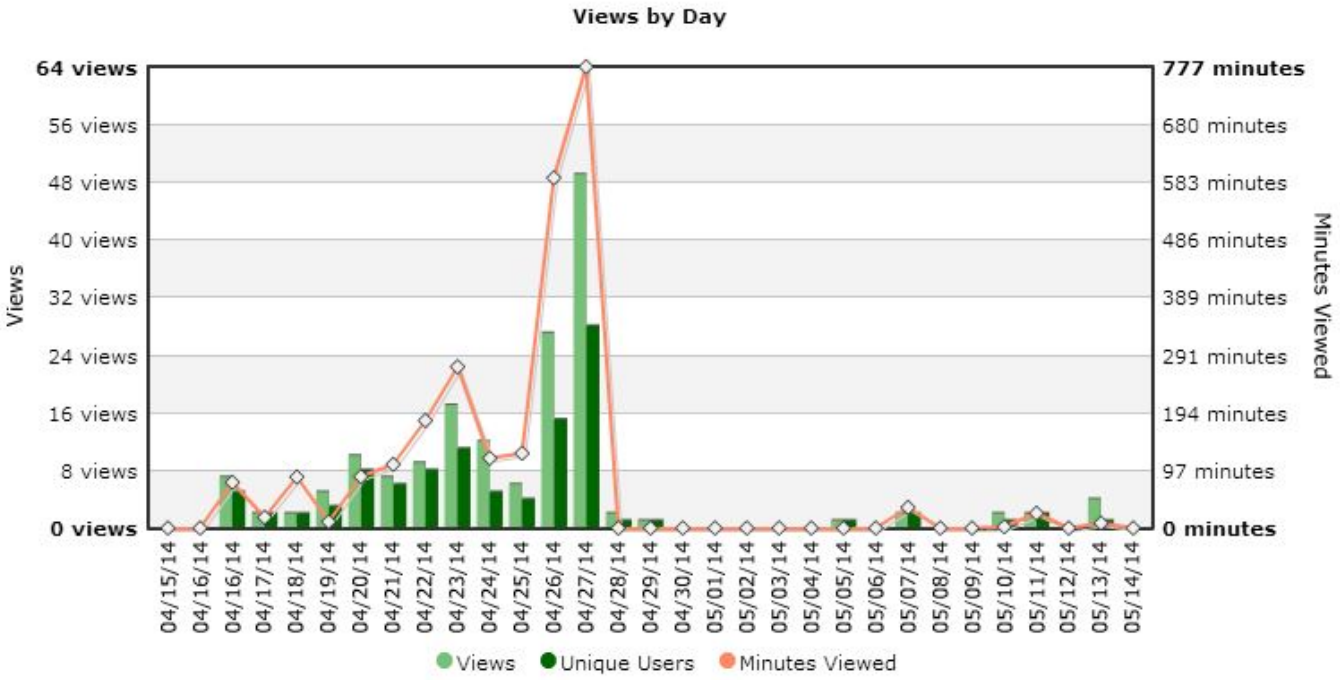
Viewer Data



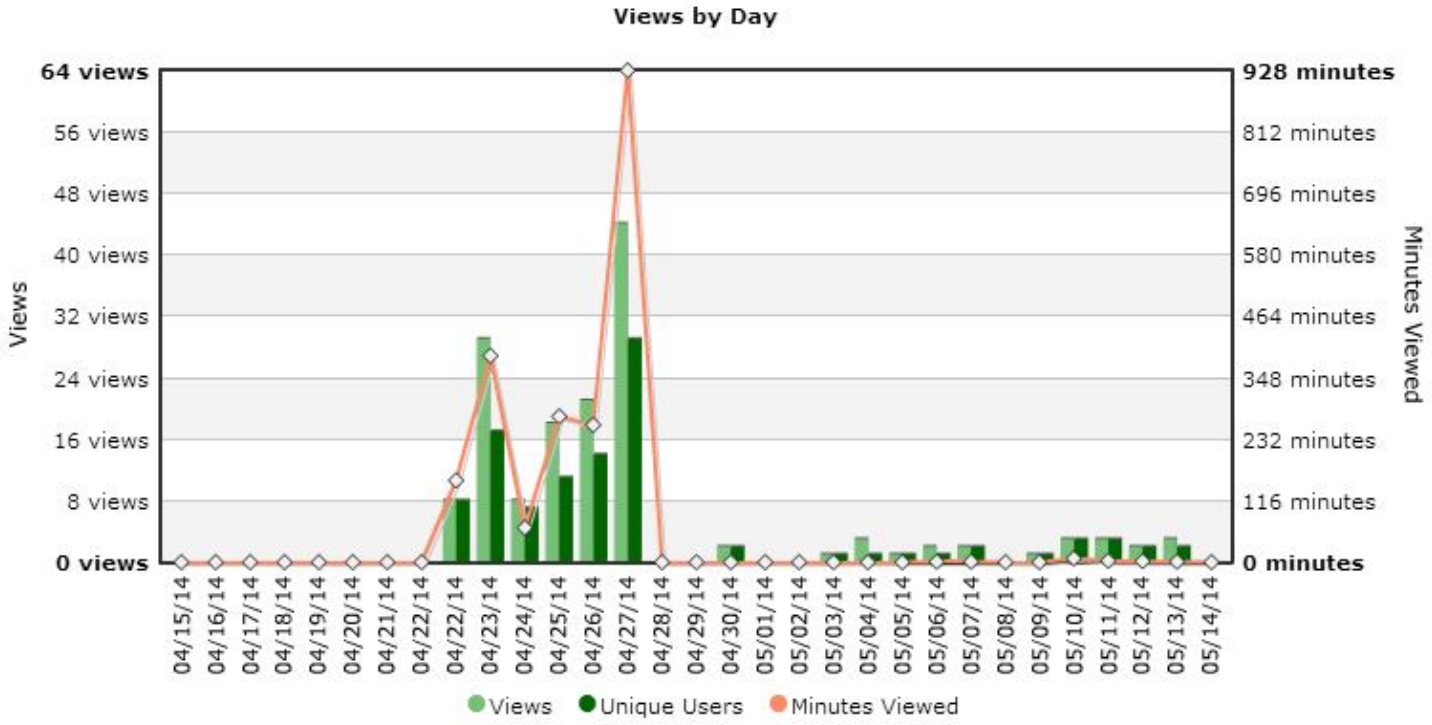
Testing out the video/ First Ventilation Lecture



2nd Ventilation Lecture



Exercise Lecture



Review Lecture

Student Comments

The angle of the videos was a little strange and I wish there were more videos.
5/14/2014 12:40 AM
The video's were good. Improvement not really needed. -John Cao 006580546
5/13/2014 10:49 PM
Nothing really, usually other professors only record their computer screen which leaves all the board work cut off, so it was helpful that you used your webcam
5/13/2014 9:15 PM
I think it would be easier to follow if the camera was straight on rather than at the angle
5/13/2014 7:44 PM
It was great, It lags a little when you change your slides order
5/13/2014 3:05 PM
I think having the video would be best so we are able to follow where you are if you skip around.
5/13/2014 2:50 PM
Maybe a better angle. But the videos are fantastic if the audio, the professor, and the powerpoint are all in sensory perception.
5/13/2014 1:57 PM
It would be much better if the recoding could show whatever the teacher is pointing at during lecture
5/13/2014 9:48 AM
The video and audio quality could be improved.
5/13/2014 6:30 AM
Possibly setting up the camera so it directly faces the screen instead of off to the side.
5/13/2014 12:54 AM
Better quality
5/13/2014 12:15 AM
The video with PowerPoint slides were very helpful
5/12/2014 11:58 PM
The videos were nice for times when you -understandably - would point at slides and say this happens here but not here. Can't really discern your meaning from just a recording. A better view would be helpful, but..limited equipment. Don't know if they can get much better. Very accessible and easy to work.
5/12/2014 11:33 PM
Dr. Ashley Carter used prerecorded videos for his evolution course last semester that he uploaded a day before the lecture. This allowed me to watch the videos in advance, and prepare any questions I had on topics that I found difficult to understand.
5/12/2014 10:56 PM
If at all possible it would be nice if the video has a feature or tab to jump to specific topics instead of us having to search for them
5/12/2014 10:55 PM
So I know what slide you're discussing or what figure you're referring to because you often jump around and there are duplicate slides or many that you skip. Thanks!
5/12/2014 10:45 PM
Just having them is very useful to students who don't have voice recorders or if they miss class.
5/12/2014 10:11 PM
If the videos were able to show what you were pointing to/talking about on the slides/in the diagrams(especially when you have a lot of pictures),it would help a lot.
5/12/2014 9:57 PM
Having the focus of the videos being centered on the powerpoint. Being able to see what you are pointing out during lecture is incredibly helpful.
5/12/2014 9:47 PM
To aim the camera directly at the professor so I could see what he's pointing at The videos help because sometimes I don't know what slide he is on and the video moves with him. It goes with what slide he is on which is pretty cool, I think.
5/12/2014 9:45 PM
There was a lot of background noise using the laptop's microphone. Maybe you could wear a wireless one that will only pick up your voice?
5/12/2014 9:27 PM
The videos are fine as they are now.

5/12/2014 9:20 PM
it would be better if the camera was in the middle and recorded the board and slides together. when you pointed the graphs, it was really hard to see in the video where you are pointing at. otherwise, it was really helpful. Thank you
5/12/2014 9:09 PM
The videos were great. The program was a bit slow at times and froze up on the slides but there's not much you can do about it. The lecture recordings help but videos are even better because you skip around in the power points sometimes and it's hard to follow on a lecture recording.
5/12/2014 9:06 PM
The video recordings are sufficient.
5/12/2014 8:59 PM
comprehensive and cohesive flow of powerpoints so that both audio recordings and even videos will be easier to follow
5/12/2014 8:54 PM
The videos were pretty good.
5/12/2014 8:51 PM
The videos were awesome! It took some getting used to and I found that I have a pretty solid system down myself and didn't want to transition over for the last exam. However, continue the videos!
5/12/2014 8:43 PM
A view that is directly in front of the screen would help.
5/12/2014 8:34 PM
A pointer on the slides indicating what you are talking about when you are referring to a specific image/part of the image
5/12/2014 8:03 PM
The videos were very useful when reviewing lecture material. The angle at which the video was good as well, I dont have any suggestion other than recomending their use for future student learning.
5/12/2014 8:02 PM
None. The videos are already amazing :)
5/12/2014 8:01 PM
The video features like contents, which breaks down each slide into its easy to find category and how many minutes was spent on it was very helpful. I wish videos were provided for chapters like ventilation or kidney, which showed many graphs or pictures and little explanation in slides. Although I recorded and listened back to lectures, providing videos would have been more helpful since I could see exactly where the teacher is pointing and referring to. -Lillian Pham
5/12/2014 7:59 PM
I really like that you can follow along like you're in class. It would be helpful to have a better angle of the screen for the video portion. It's a great study aid and resource if you missed something in class.
5/12/2014 7:55 PM
Better angle and resolution
5/12/2014 7:46 PM
Nothing, I liked how it was formatted and how it was displayed when watching it! Very Helpful!
5/12/2014 7:39 PM
Better recording angle
5/12/2014 7:36 PM
Nope.
5/12/2014 7:35 PM
The video were very helpful when we jumped from different slides and when we watched videos in class. If the videos were not available, I would listen the the audio recording I took. Thank you!
5/12/2014 7:25 PM
I think a full view of the professor actually lecturing would improve my learning because during lecture the professor would usually point out details on the lecture slides/board and that helps quite a bit. An angled view of the professor lecturing is subpar, but it still helped in the end.
5/12/2014 7:23 PM
The video recordings of lectures were a REALLY great study tool in preparation for exams. I do wish that the supplemental videos shown during class could be viewed in the recordings too. Thank you for trying this out!
5/12/2014 7:07 PM
if the camera was pointed directly at the screen it would be easier to see what you are pointing at; it may be difficult to have the camera at that position though.
5/12/2014 7:05 PM
Able to see the slides too as listening the audio
5/12/2014 7:05 PM

Easier access. I had an instructor last semester who also posted videos and the link was among the tabs with Dropbox and Content. It was a little difficult to figure out how to access them since the link asked me to log in and even though I was already logged into BB. Also, my student i.d. and password didn't work for two of them for some reason, so I was unable to view them.

5/12/2014 7:05 PM

I wish it had started earlier, but that's okay. Also, I have a mac and it wasnt as compatible. I had to click on another link to see it. Maybe just warn the students for that. Very useful!

5/12/2014 7:03 PM

Start video recording in the beginning of semester to get in the habit of watching them before the exams and making time for them.

5/12/2014 6:59 PM

There's extra slides that do not need to be there. Other than that, the videos are solid as they are.

5/12/2014 6:58 PM

Emphasizing the main parts of the videos that are on the exam. Most of the videos put in so much information that you did not cover, so I wasn't sure if the information was important. All the extra information confused me.

5/12/2014 6:56 PM

Record more lecture video.

5/12/2014 6:56 PM

I think the place where the camera was placed was not good and the sound was not clear as expected.

5/12/2014 6:53 PM

THE AUDIO OF VIDEO WAS NOT CLEAR SOMETIMES.

5/12/2014 6:53 PM

i think the videos would be easier to watch if the camera angle was better.

5/12/2014 6:53 PM

If the camera was centered where we can see the power point and the professor better.

5/12/2014 6:49 PM

It would be cool if you could incorporate the internet videos that you show in class into the lecture videos.

5/12/2014 6:48 PM

Having the camera in the middle of the class instead of the side.

5/12/2014 6:48 PM

Maybe have it placed somewhere more centered and have a pointer that is visible in the video.

5/12/2014 6:46 PM

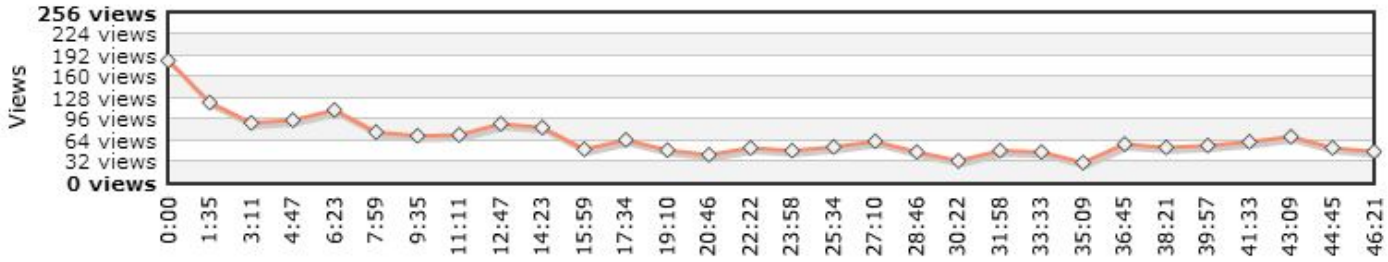
Using panopto is ideal since we can see which slide we're at.

5/12/2014 6:46 PM

Nothing they are great

/12/2014 6:43 PM

Minutes Viewed Data



Past Day | Past Week | **Past Month** | Past Year | All Time

Download

Viewer (top 100 by minutes viewed)	Views	Minutes Viewed
anonymous (ID: 00000000-0000-0000-0000-000000000000)	15	256
anonymous (ID: 5b25e97f-3912-49e2-9f70-12447c4de902)	1	106
anonymous (ID: 89932d33-f316-4f14-8ce9-01f3452520b5)	2	104
anonymous (ID: ed12fb1c-d0c8-4bbf-9c86-1ddbc62cf7a0)	3	89
anonymous (ID: 2290cedc-a95b-4658-8a99-5e369ed7c7db)	1	79
anonymous (ID: 2f833224-8ff3-4f83-9b65-9e2f91495d01)	5	76
bbcsulb\meliss.pena36@gmail.com	3	73
anonymous (ID: eb00c8e7-0195-4cb3-b402-198d6189033a)	1	70
anonymous (ID: 3540cea3-99cc-4357-8956-ff64be5e6bd4)	2	67
anonymous (ID: a13b4d24-3032-432e-ac41-055981c401e2)	2	65
anonymous (ID: 231208dd-4ca1-4dca-af55-cc6ebbf063dd)	3	64
anonymous (ID: 2f8dbb12-f1c2-4789-bf9c-daf5a759d5f1)	1	58
anonymous (ID: 3eab738a-ea24-4bb2-a529-1f45c38ee453)	1	57
bbcsulb\djlindsey74@yahoo.com	2	55
anonymous (ID: fb4b3cd8-6327-4aa0-aa72-477c4be0d88b)	5	54
anonymous (ID: ad3ff98e-6776-473e-b73d-12341a6d4639)	2	53
anonymous (ID: 0d6280f2-a5a7-44b2-91c9-0280d9ba2734)	1	51
anonymous (ID: be7082df-5dba-41d9-ab08-4b60cb4b9ef5)	2	49
anonymous (ID: f0b3215b-4949-4d55-82ba-e5994dce179e)	1	48
anonymous (ID: c04825fa-a6c8-4ef6-9a60-45df62987780)	1	48
anonymous (ID: 91b06f94-ad5f-4285-a0e5-df119657dd17)	1	48
anonymous (ID: 5bb3242a-e818-4e65-ae98-6477566e024a)	1	48
anonymous (ID: 1519c7d8-e262-4828-993e-800f4f3b7119)	2	47
anonymous (ID: 7da98b35-6a21-419c-a1af-0f21f33cc6fe)	1	46
anonymous (ID: f7ed3b89-a93d-4a36-aac8-74b774e23e45)	2	44
bbcsulb\amanduharris@gmail.com	3	43
bbcsulb\bunry_horn@yahoo.com	1	30
anonymous (ID: 9d58b7f7-3e36-4c4a-878b-ebfb4acec4cc)	1	24

Viewer (top 100 by minutes viewed)	Views	Minutes Viewed
anonymous (ID: eb00c8e7-0195-4cb3-b402-198d6189033a)	1	182
anonymous (ID: 00000000-0000-0000-0000-000000000000)	18	169
anonymous (ID: be7082df-5dba-41d9-ab08-4b60cb4b9ef5)	8	162
anonymous (ID: 0d6280f2-a5a7-44b2-91c9-0280d9ba2734)	3	140
anonymous (ID: 5b25e97f-3912-49e2-9f70-12447c4de902)	6	120
anonymous (ID: 7dfe7a24-304b-4fd2-8aec-35f034bef455)	1	110
anonymous (ID: 4e3d336d-3dda-4b91-a989-bbab752d9ade)	4	105
bbcsulb\bunry_horn@yahoo.com	1	103
anonymous (ID: f7af9414-c5d2-4094-811b-d2fdd53f25ea)	2	87
anonymous (ID: 22dc6591-c728-4496-9134-f586c6a8ec2a)	3	87
anonymous (ID: 5bb3242a-e818-4e65-ae98-6477566e024a)	6	87
bbcsulb\crystalheath17@gmail.com	6	87
anonymous (ID: 89932d33-f316-4f14-8ce9-01f3452520b5)	1	83
anonymous (ID: fa177e9e-58e9-4db0-ba0e-36799da3e9bd)	5	81
bbcsulb\christianchik@sbcglobal.net	3	77
anonymous (ID: a13b4d24-3032-432e-ac41-055981c401e2)	2	76
bbcsulb\mzwendylew@yahoo.com	11	76
anonymous (ID: c8e5c615-3a90-4cbc-aa01-be69caa2038c)	4	74
anonymous (ID: 231208dd-4ca1-4dca-af55-cc6ebbf063dd)	1	74
anonymous (ID: f7ed3b89-a93d-4a36-aac8-74b774e23e45)	3	71
bbcsulb\chosung2loud@gmail.com	1	71
anonymous (ID: fb4b3cd8-6327-4aa0-aa72-477c4be0d88b)	2	70
anonymous (ID: 8afd76f6-83a7-4c3a-b366-e2173719dbb8)	1	69
anonymous (ID: 97077ca7-c9eb-4e01-bdca-e364f899172c)	1	69
anonymous (ID: df38d46f-fa30-4e73-a929-3a5a51b67949)	3	68
bbcsulb\sjauregui78@yahoo.com	2	68
anonymous (ID: 9da67f3a-8e96-4ed3-ba5d-8d8300f6d0de)	1	68
anonymous (ID: 7da98b35-6a21-419c-a1af-0f21f33cc6fe)	1	67
anonymous (ID: cd7ff4f6-f39b-4034-8287-6eadd9af93ca)	1	67
anonymous (ID: c04825fa-a6c8-4ef6-9a60-45df62987780)	1	66
anonymous (ID: 0596ac46-cb1e-43e4-a922-f505ae9d294d)	1	64
anonymous (ID: ad3ff98e-6776-473e-b73d-12341a6d4639)	2	64
anonymous (ID: 2f833224-8ff3-4f83-9b65-9e2f91495d01)	4	61
anonymous (ID: 2290cedc-a95b-4658-8a99-5e369ed7c7db)	1	54
bbcsulb\osidedancer_4lyfe@yahoo.com	2	53
bbcsulb\meliss.pena36@gmail.com	2	50
anonymous (ID: b136f089-de89-4fd5-a5e7-b52e1a034e33)	2	50
bbcsulb\kaylieluvsdnce5678@gmail.com	2	47
anonymous (ID: 33b15037-ddaf-46c8-b9d7-cebfd2beca01)	2	40
anonymous (ID: 91b06f94-ad5f-4285-a0e5-df119657dd17)	1	27
anonymous (ID: 55733b37-c3f9-409c-9e5e-5cac3f49d60f)	1	21

Viewer (top 100 by minutes viewed)	Views	Minutes Viewed
anonymous (ID: 00000000-0000-0000-0000-000000000000)	16	178
anonymous (ID: be7082df-5dba-41d9-ab08-4b60cb4b9ef5)	13	120
anonymous (ID: ad3ff98e-6776-473e-b73d-12341a6d4639)	2	107
anonymous (ID: f7ed3b89-a93d-4a36-aac8-74b774e23e45)	3	80
anonymous (ID: 22dc6591-c728-4496-9134-f586c6a8ec2a)	2	79
anonymous (ID: a13b4d24-3032-432e-ac41-055981c401e2)	2	75
anonymous (ID: 5b25e97f-3912-49e2-9f70-12447c4de902)	1	74
anonymous (ID: 9c2129ec-b332-476a-8aee-3389a91ba4d0)	1	71
anonymous (ID: 89932d33-f316-4f14-8ce9-01f3452520b5)	2	71
anonymous (ID: 2a3986d1-319c-4b32-83d7-b63ec6352f76)	1	70
anonymous (ID: 4e3d336d-3dda-4b91-a989-bbab752d9ade)	2	69
anonymous (ID: 7ac26431-2b9e-4b31-bba7-00af48276592)	1	68
bbcsulb\bunry_horn@yahoo.com	1	66
anonymous (ID: 231208dd-4ca1-4dca-af55-cc6ebbf063dd)	2	66
anonymous (ID: 8afd76f6-83a7-4c3a-b366-e2173719dbb8)	2	65
anonymous (ID: fb4b3cd8-6327-4aa0-aa72-477c4be0d88b)	3	65
anonymous (ID: c8e5c615-3a90-4cbc-aa01-be69caa2038c)	1	63
anonymous (ID: 0d6280f2-a5a7-44b2-91c9-0280d9ba2734)	3	63
anonymous (ID: df38d46f-fa30-4e73-a929-3a5a51b67949)	5	63
anonymous (ID: 7dfe7a24-304b-4fd2-8aec-35f034bef455)	1	60
anonymous (ID: 2f833224-8ff3-4f83-9b65-9e2f91495d01)	1	60
anonymous (ID: 5bb3242a-e818-4e65-ae98-6477566e024a)	3	58
anonymous (ID: 97077ca7-c9eb-4e01-bdca-e364f899172c)	1	56
anonymous (ID: 8d18ad28-ef51-420b-8c00-36ff231ce99f)	1	55
bbcsulb\crystalheath17@gmail.com	2	55
anonymous (ID: c04825fa-a6c8-4ef6-9a60-45df62987780)	1	55
bbcsulb\chosung2loud@gmail.com	1	54
anonymous (ID: 7051bb27-98df-4744-97e3-ab57a737e1f1)	1	52
anonymous (ID: eb00c8e7-0195-4cb3-b402-198d6189033a)	1	52
anonymous (ID: 0596ac46-cb1e-43e4-a922-f505ae9d294d)	2	47
anonymous (ID: 4b58839f-2a8c-4b36-a6fe-1f514a184e20)	1	42
anonymous (ID: 12abdc78-5718-432f-a715-7431e69ebe9f)	1	41
anonymous (ID: b136f089-de89-4fd5-a5e7-b52e1a034e33)	3	38
bbcsulb\meliss.pena36@gmail.com	1	35
bbcsulb\mzwendylew@yahoo.com	6	32
bbcsulb\amanduharris@gmail.com	6	24
anonymous (ID: 0f9ecf22-69fd-485d-8365-68b75a109887)	1	23
anonymous (ID: 9da67f3a-8e96-4ed3-ba5d-8d8300f6d0de)	2	21
anonymous (ID: e01a9bd7-0a4a-4f89-a029-fe4242301395)	1	21
anonymous (ID: 173a1e30-85c1-4ada-86af-83150389725a)	2	20
bbcsulb\christianchik@sbcglobal.net	1	18
bbcsulb\kaylieluvsdnce5678@gmail.com	1	18

Viewer (top 100 by minutes viewed)	Views	Minutes Viewed
anonymous (ID: 00000000-0000-0000-0000-000000000000)	13	142
anonymous (ID: 7dfe7a24-304b-4fd2-8aec-35f034bef455)	1	111
anonymous (ID: 5b25e97f-3912-49e2-9f70-12447c4de902)	4	85
bbcsulb\karissayuzon@gmail.com	2	83
bbcsulb\lino_hernandez@yahoo.com	2	79
anonymous (ID: 231208dd-4ca1-4dca-af55-cc6ebbf063dd)	6	75
bbcsulb\mondo_1990@yahoo.com	5	69
anonymous (ID: f7ed3b89-a93d-4a36-aac8-74b774e23e45)	4	67
anonymous (ID: 55733b37-c3f9-409c-9e5e-5cac3f49d60f)	2	67
anonymous (ID: f04e4bc7-e040-4a69-94d5-f041c732240e)	2	66
anonymous (ID: 0768e35f-726f-4088-8744-2526d5b22ddc)	2	66
anonymous (ID: 1519c7d8-e262-4828-993e-800f4f3b7119)	3	60
anonymous (ID: 89932d33-f316-4f14-8ce9-01f3452520b5)	3	59
anonymous (ID: ad3ff98e-6776-473e-b73d-12341a6d4639)	1	57
anonymous (ID: 210cbc3d-1cc8-4c0d-b0f1-1c45a6bebc8d)	1	56
anonymous (ID: 2f8dbb12-f1c2-4789-bf9c-daf5a759d5f1)	3	55
bbcsulb\yeyuanhuang@yahoo.com	4	52
anonymous (ID: 2a3986d1-319c-4b32-83d7-b63ec6352f76)	2	48
anonymous (ID: c8e5c615-3a90-4cbc-aa01-be69caa2038c)	3	47
anonymous (ID: 22dc6591-c728-4496-9134-f586c6a8ec2a)	1	47
anonymous (ID: a7a99a7a-91b7-4c8c-9cfd-22329b4627f9)	1	46
anonymous (ID: be7082df-5dba-41d9-ab08-4b60cb4b9ef5)	1	44
anonymous (ID: 6129452c-50b3-475e-98f0-dcfe7d34ea4f)	3	44
anonymous (ID: 8d107ce3-7c20-4e2b-abed-4debde3b6f7c)	1	44
anonymous (ID: 33b15037-ddaf-46c8-b9d7-cebfd2beca01)	1	44
anonymous (ID: 8a03a3a5-17eb-41f5-930d-21f85b7b60b8)	1	43
anonymous (ID: a13b4d24-3032-432e-ac41-055981c401e2)	3	43
anonymous (ID: 12abdc78-5718-432f-a715-7431e69ebe9f)	1	41
bbcsulb\sjauregui78@yahoo.com	1	40
anonymous (ID: 5bb3242a-e818-4e65-ae98-6477566e024a)	3	40
anonymous (ID: 4b58839f-2a8c-4b36-a6fe-1f514a184e20)	1	37
anonymous (ID: 6fb1a018-f71d-4139-850f-17305d6d6a7b)	1	36
anonymous (ID: 0f9ecf22-69fd-485d-8365-68b75a109887)	1	36
bbcsulb\patriots13365@yahoo.com	2	34
anonymous (ID: cd7ff4f6-f39b-4034-8287-6eadd9af93ca)	3	32
bbcsulb\meliss.pena36@gmail.com	1	24
anonymous (ID: fb4b3cd8-6327-4aa0-aa72-477c4be0d88b)	3	23
bbcsulb\bunry_horn@yahoo.com	1	21
anonymous (ID: a11c7697-17c1-4cbb-a8f9-7fb373e09a73)	1	10
bbcsulb\osidedancer_4lyfe@yahoo.com	1	9
anonymous (ID: 04cb7a5a-6f38-412a-a3ad-e3f567adfe20)	1	6
anonymous (ID: 5d615af7-732a-47c9-8ef8-69e626448e14)	1	4
anonymous (ID: ada15f33-c586-487d-be7c-f5353a39724e)	3	3

Spring 2014 CNSM Faculty Learning Community Final Report

Jason Schwans
Department of Chemistry and Biochemistry
CHEM 322B (Organic chemistry - 2nd semester of a two semester sequence)
No. of Students: 79

Background

CHEM 322B is the second semester of two-semester organic chemistry sequence for non-chemistry majors. The course is not an 'easier' version of organic chemistry, but as most of the students are biology majors the course was intended to use a substantial number of examples from biology to explain chemical concepts. This course and the first semester in the sequence (the 'A section', CHEM 322A) are courses with high failure rates. A significant challenge facing students in CHEM 322B is that organic chemistry is highly structured and continually requires an understanding and application of essential concepts, i.e., an understanding of the fundamental concepts of organic chemistry (covered in CHEM 322A) is necessary to be successful in CHEM 322B. Students who do not possess an understanding of the basic material are setting themselves up for failure. While all students in CHEM 322B passed CHEM 322A, thereby demonstrating proficiently in the material, some students may have forgotten material over time or may have had only an extremely limited understanding of the material.

For the Spring 2014 semester, together with my colleagues Drs. Nakayama and Berryhill who taught the same or similar course (CHEM 322B and CHEM 320B), we implemented a 'review exam' in the first week of class to assess students' understanding of essential material from the A course. The purpose of this exam was to help students identify weaknesses in their understanding of essential material early, so they could immediately rectify these gaps in understanding before not understanding the fundamentals and trying to address new material compounds their difficulties. In addition, we could identify struggling students early and recommend advising with the SAS center and enrollment in Supplemental Instruction.

The exam score counted towards the course grade was worth 50 points (1/2 of a midterm exam) and in my section was 50 out of 625 total points in the course (8%).

Preparation for the Review Exam

To help students prepare for the exam, an email was sent to all enrolled students and students on the waiting list ~2.5 weeks prior to the beginning of the semester. The email stated that an exam will be given the 2nd day of class and provided some directions of the material to be covered. I also sent an email to all students in my class on the waiting list with pointers on material to review and noted that posted practice problems (without answers) were posted on Beachboard. As students on the waiting list cannot access Beachboard, I mentioned in the email that if anyone cannot access the practice problems to please email me and I would send them the materials –many students did email. Approximately, one week before the start of the semester I posted solutions for the problems on Beachboard and sent solutions to all students who inquired.

The first day of class was spent reviewing important fundamental material in addition to time spent on administrative and introductory material. Regardless of having a review exam, this class time would likely be used primarily for review due to the sequential nature of the organic

chemistry sequence, so preparing for and having the exam did not consume much lecture time compared to a scenario in which the exam was not given. The second day of class was spent covering additional material that bridged between the A and B courses, and the final 45 minutes was used for the exam.

Administering the Review Exam

The exam contained 25 multiple-choice questions. This allowed fast grading so the results could be readily disseminated to the students. An identical exam was given to the two CHEM 322B) sections –the sections met on the same day within 15 min limiting any transfer of information between the two sections. The results of the exam are given in Figure 1.

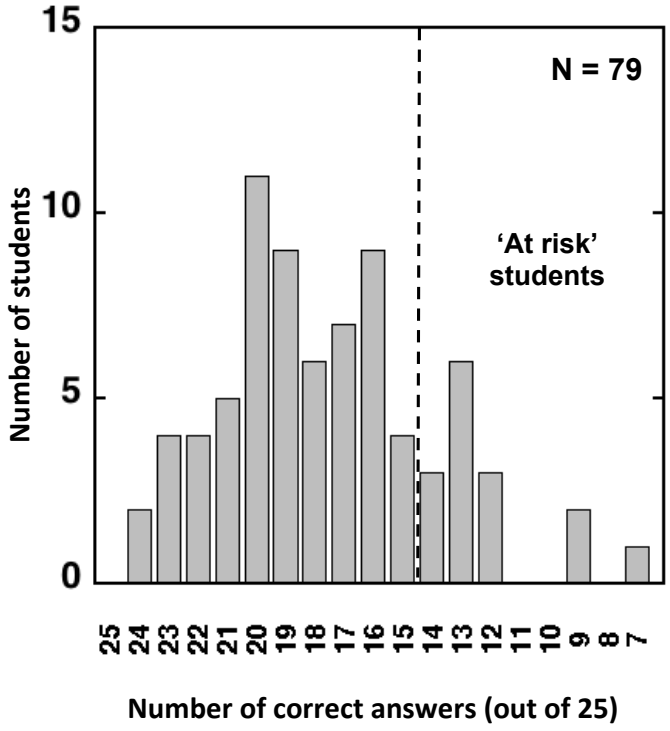


Figure 1. Review exam scores.

In general the results were encouraging with an average score of 69%. Students with 14 or less correct (54% correct) answers were sent an email from the department urging them to meet with the SAS center for advising and to enroll in SI. Few students took advantage of SI as only 7 out of 79 in the class were enrolled in SI Spring 2014 and not all of these students are those who score below 54% on the review exam.

Comparing Performance on the Review Exam and Course Performance

As described above, a primary goal of the review exam was for the early identification of struggling students. To evaluate if students' performance on the review exam might be a predictor of course performance, I compared the overall course grade with the grade on the review exam (Figure 2).

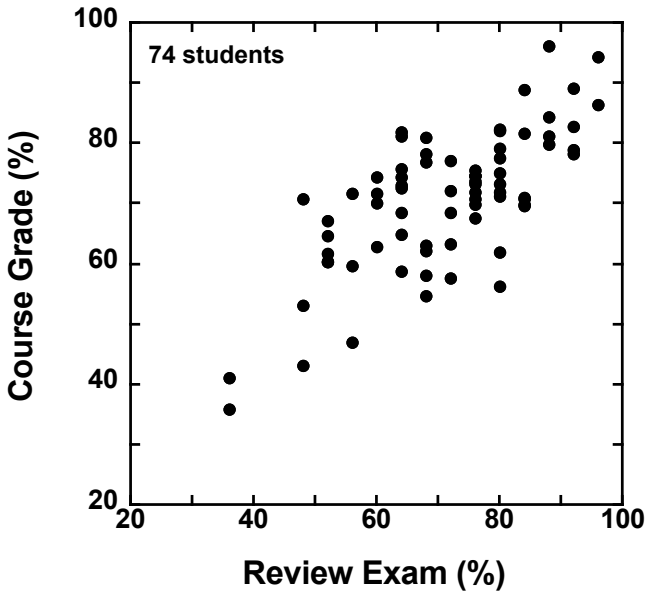
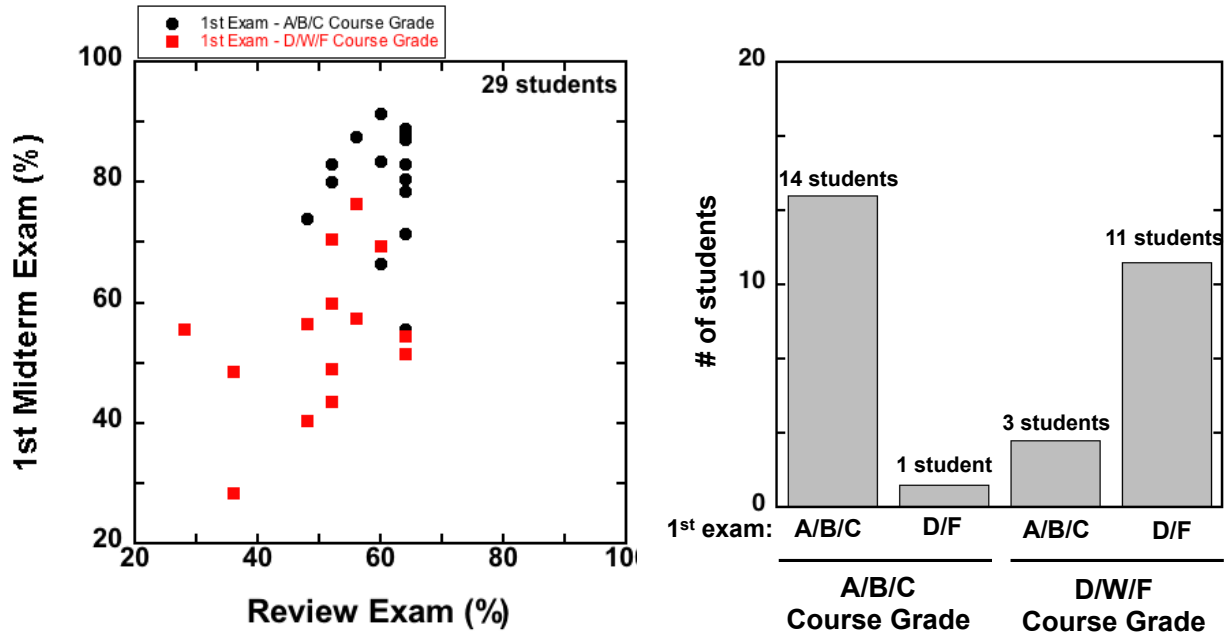


Figure 2. Comparison of review exam scores and course grades. Five students took the review exam withdrew from the course and their review exam scores are not included in the plot.

The results show students who performed well on the review exam overall performed well in the course. While many factors are likely involved, these students demonstrated a grasp of the essential material necessary to continue in CHEM 322B. Many students who failed to demonstrate this grasp of the essential material continued to struggle. The students who withdrew from the course were not necessarily the lowest performing students as their review exam scores were: 80, 72, 64, 52, and 14%. The higher performing students in general changed their major and no longer needed the course.

52% of students who did not pass the review exam passed the course (15 of the 29 with failing scores on the review exam). To evaluate if these students started to excel after the review exam, the score on the first midterm exam relative to the review exam was compared.



- The results indicate ~50% of students who did poorly on the review exam had the capability to pass the 1st exam and ultimately pass the course.
    - The threshold for passing/not passing the review exam may affect the results, as 8 of the 14 were one question below the passing cutoff for the review exam.
- These students went on as B/C students who may have not prepared for the review exam and/or used their poor performance on the review exam as motivation to do well on the 1st midterm.

These results suggest students who did poorly on the review exam and continue to do poorly on the 1st exam are already on the track to not succeed. Only one student passed after a failing score on the review exam and 1st midterm.

Conclusions

The goal was early identification of students struggling with material from first semester of organic chemistry (and for these students to recognize that they do not understand essential material). While all students in the CHEM 322B passed CHEM 322A, thereby demonstrating proficiency in this material, some students may have had only a limited grasp of the material and/or may have forgotten material over time. Indeed, students who performed poorly on an exam covering fundamental material generally showed a lower performance in the course. Together with the results form the first midterm exam, the trajectory of most struggling students is apparent. These assessments were given early in the course, so students had the time and opportunities to succeed and many students did after the review exam.

Early identification of struggling students is an important first step in promoting student success –the next goal is to better help these identified students succeed.

CNSM Faculty Learning Community Final Report

Dr. Ted Stankowich

Department of Biological Sciences

BIOL 312 (Evolutionary Biology)
Number of Students Initially Enrolled: 48
Number of Students Completing the Course: 46

Introduction

In 2013, I taught Evolutionary Biology (BIOL 312) for the first time at CSULB. The course is divided into three main units: 1) Natural Selection & Evolutionary History; 2) Population and Quantitative Genetics; and 3) Adaptation, Sexual Selection, and Sociality. By far, the most difficult material for students to master is in the Population Genetics and Quantitative Genetics unit. After they are taught the population genetics material, the students are given a problem set to complete that has 3-4 large, multistep problems that cover Hardy-Weinberg genetics, Fisher-Haldane Selection Models, and Mutation-Selection Equilibrium. In 2013, I simply lectured on these topics, gave them a sample problem to complete at home, worked through the problem in class the next day, then moved on with new material. The problem set questions were very difficult, however, and required the students to be able to manipulate the data given to them to get the numbers they needed to use the equations I taught in class. This is often a step the students struggle with. I make this problem set particularly difficult because I can't ask them such involved and mathematically complicated questions on a short exam. This is essentially a take home exam with just a couple of very difficult questions.

In 2014, in hopes of improving grades on both the problem set and the exam that covers this material, I chose to convert half of one of the lectures into an online lecture, then spend an entire lecture period going over a sample problem and give them time to work on their problem set in class. I took the review material on Hardy-Weinberg genetics (calculating allele and genotype frequencies, working with the HW equation) and recorded an audio file onto the powerpoint file. Students were asked to listen to this 30 min lecture prior to coming to the first class on population genetics. I spent 2 full lectures going through the Fisher-Haldane Selection Models, working through a simple example for each one. At the end of the second lecture, I provided them with the same sample question I gave the students in 2013 and asked them to try to work through it on their own before the next class.

For the third lecture, I reviewed the general strategy of answering a selection model question; from converting phenotype frequencies to genotype frequencies, calculating selection coefficients, and predicting future change in allele frequencies due to selection. I then went

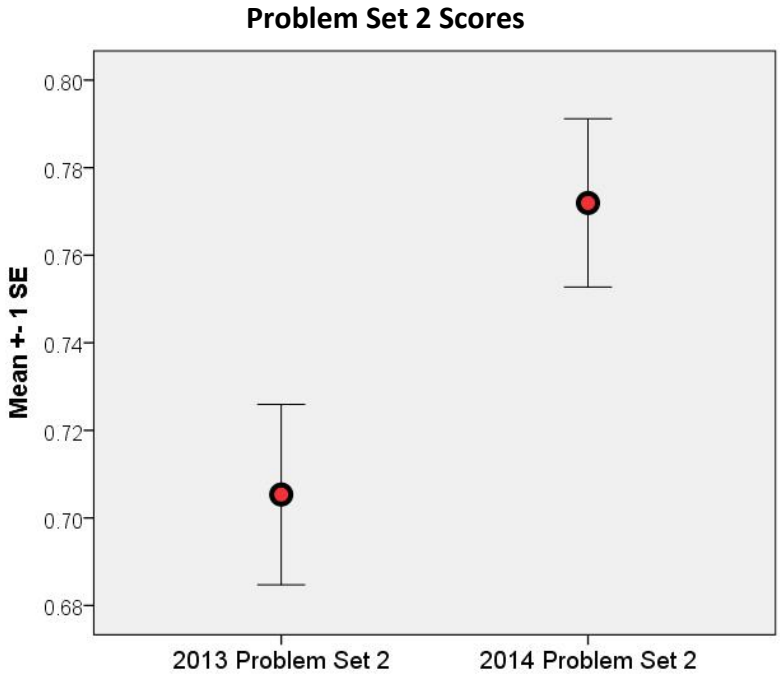
through the sample problem on the board. I answered any remaining questions and then asked them to begin working on their problem sets. I was able to give them guidance in class and let them talk about it with each other. This extra class time devoted to the calculations and strategies for answering these questions should have given the students more experience with the techniques and improved their understanding of the topic and scores on the problem set and exam.

Problem Set 2 was nearly identical between years except for two distinctions. First, I deleted the problem from 2013 on genetic drift to bring the total score down from 50 to 40. Second, I changed the numbers used in the problems so that the calculations were not identical between years for the other three problems; otherwise, the remaining questions were of equal difficulty.

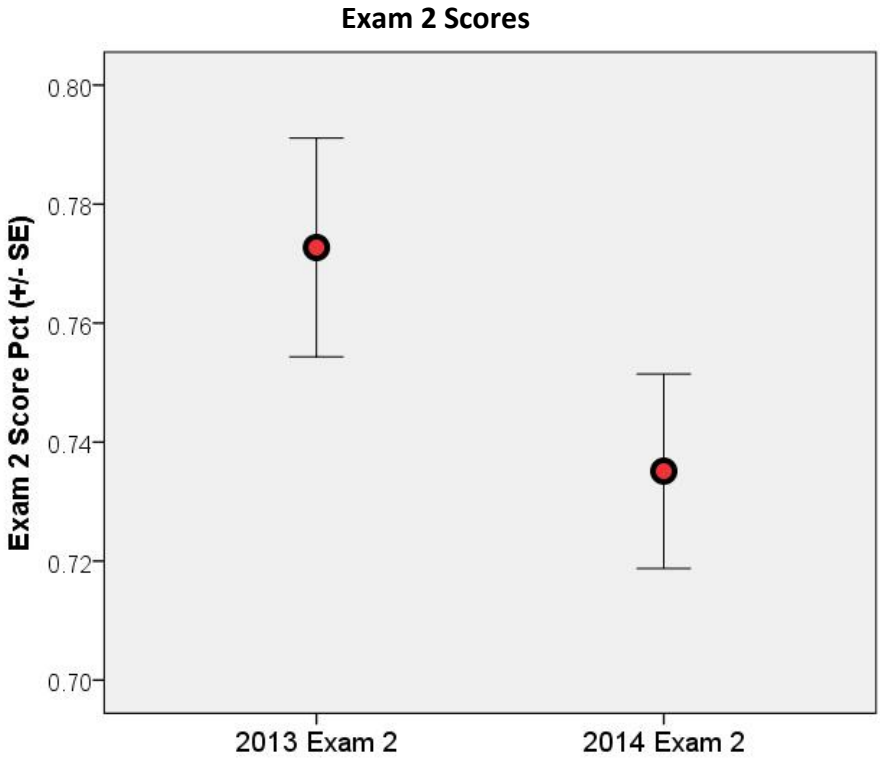
Exam 2 necessarily had several changes between the years but the questions covering the relevant material were fairly similar. Therefore, while we can gain a general perspective of whether the students improved between years, there is significant room for outside influences on the exam averages. Further, data on student performance on the specifically relevant questions was not collected in 2013, but was collected in 2014.

Results

Students showed marked improvement on Problem Set 2 between 2013 and 2014. There was a significant increase in average score between the years (t-test: t=-2.720, df=91, p=0.008).



There was a decline in scores on Exam 2 between 2013 and 2014; however, this difference was not statistically significant (t-test: t=1.154, df=91, p=0.251).



The students' performances on the questions relevant to the problem set show a different story. Exam 2 had one question on mutation-selection equilibrium worth 8 points and one question on the selection models worth 18 points. Their average scores on these two questions were 79% and 82%, respectively, which is actually higher than the overall mean of Spring 2014 Exam 2 (73.7%). This suggests that their responses to this material helped their overall exam grade. Similar data from 2013 Exam 2 is not available; data from these specific questions were recorded for this report.

In addition to this analysis, identical pre- and post-term assessments were given in 2014 only. The assessment consisted of 10 multiple choice questions. The average score on the pre-term assessment was 40% and the average score on the post-term assessment was 69%, demonstrating an overall improvement. There was improvement on 9 out of 10 of the questions. An identical assessment will be given next year for comparison.

Discussion & Conclusions

Overall, students showed a strong improvement in their performance on material relevant to the partially flipped lecture and enhanced classroom discussion. Scores increased significantly on Problem Set 2 between years and their performance on the relevant material on Exam 2 actually helped their overall exam grade, instead of hurting it. What was a weakness, became a strength.

The removal of the extra question from Problem Set 2 might have had some influence on the change in scores between years, but that question was less math-intensive and likely easier than two of the three questions that remained in the problem set. If anything, I believe that the removal of the question would have lowered their overall averages, but the data show the opposite, suggesting that the pedagogical changes were the source of the improvement in performance.

Clearly non-relevant questions on Exam 2 had a strong influence on the overall exam averages, resulting in a non-significant drop in overall score. I believe though, that the strong performance on the relevant questions in 2014 was a result of extra time spent in class on this material. On the other hand, the increased focus on answering these types of questions in class may have caused students to disproportionately focus on this material while studying for the exam, resulting in higher scores on these questions. This is unfortunate because they were specifically warned that this material would only be a small proportion of the exam. I told them that I make the problem sets very difficult because I can't ask them in depth questions requiring significant calculations on the exam, so their problem set is their comprehensive "exam" on this material. The actual exam questions are much more straightforward.

I will be teaching BIOL 312 again in Fall 2014 and plan to use the same strategy for teaching the population genetics material. I believe that eliminating the review material from class time and spending more time on working through problems with the students significantly improved their comprehension of the material. I plan to overhaul 2-3 more lectures this fall with new material and possibly add another quantitative exercise to the course. I will also monitor the performances of students on the relevant questions on Exam 2 and compare them to Spring 2014 to see if there was any further improvement.

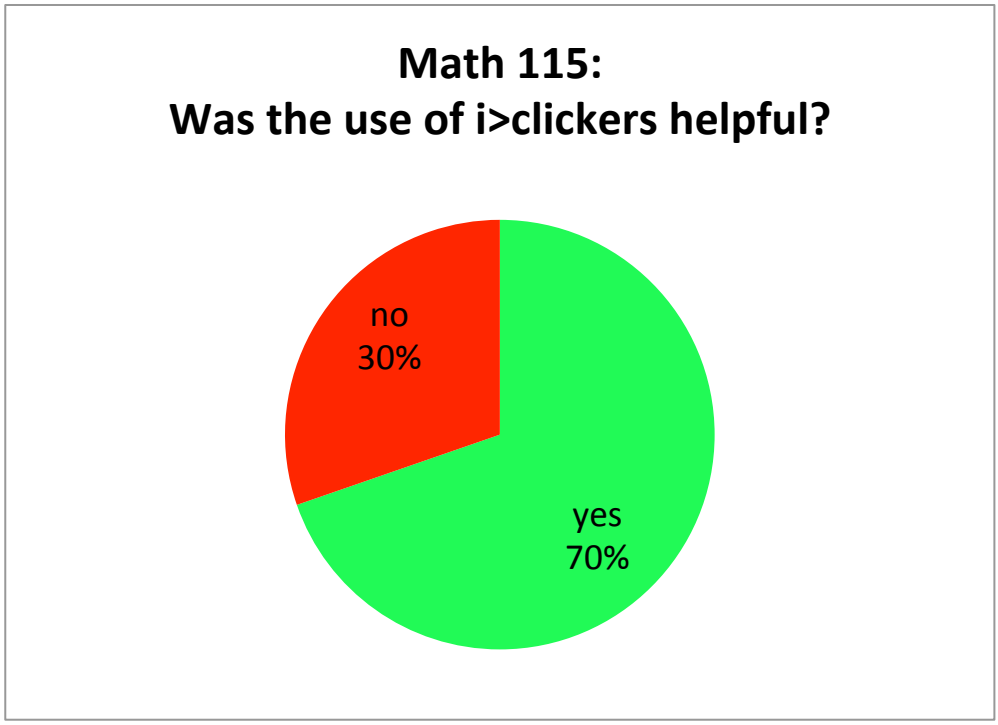
I feel that my participation in the FLC was greatly beneficial to my overall approach to presenting material and assessing student performance. While I prefer the traditional lecture style for most courses, flipping some lectures and spending more time in class going through exercises is a powerful way to enhance student comprehension of quantitative tasks and breaks

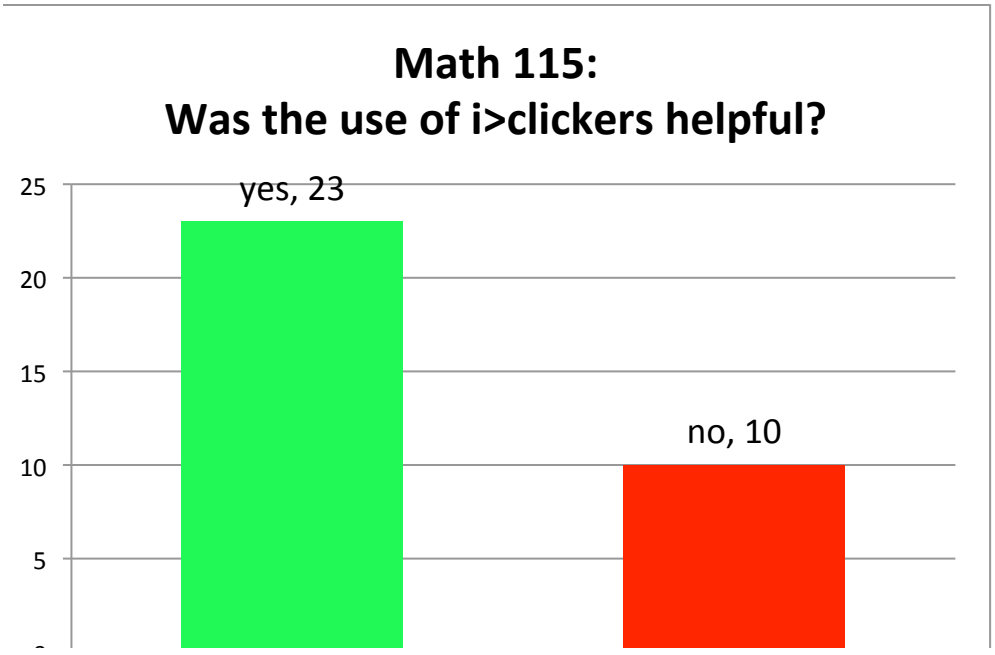
up the routine of lecturing every week. The assigned readings on the different forms of assessment really gave me several new ideas for how to approach assessing how effective I'm being in presenting the material in a meaningful way. I asked my students to specifically address the flipped lecture and extra class time spent on the problem set when filling out their student evaluations, so I am eager to read their opinions of this experiment.

In general, I got overwhelmingly positive responses from students in BIOL 312 about my teaching style and ability to make more mathematically oriented material seem clearer. Many plan to take my mammalogy and behavioral ecology courses next year specifically because I am teaching them. They did note, however, that my courses were very difficult but fair and taught in an effective way. As I move forward, I plan to keep learning new pedagogical techniques and experiment with new ways to become a more effective teacher.

Math 115 33 out of 96 responded.
Was the use of iclickers helpful?

yes	23
no	10

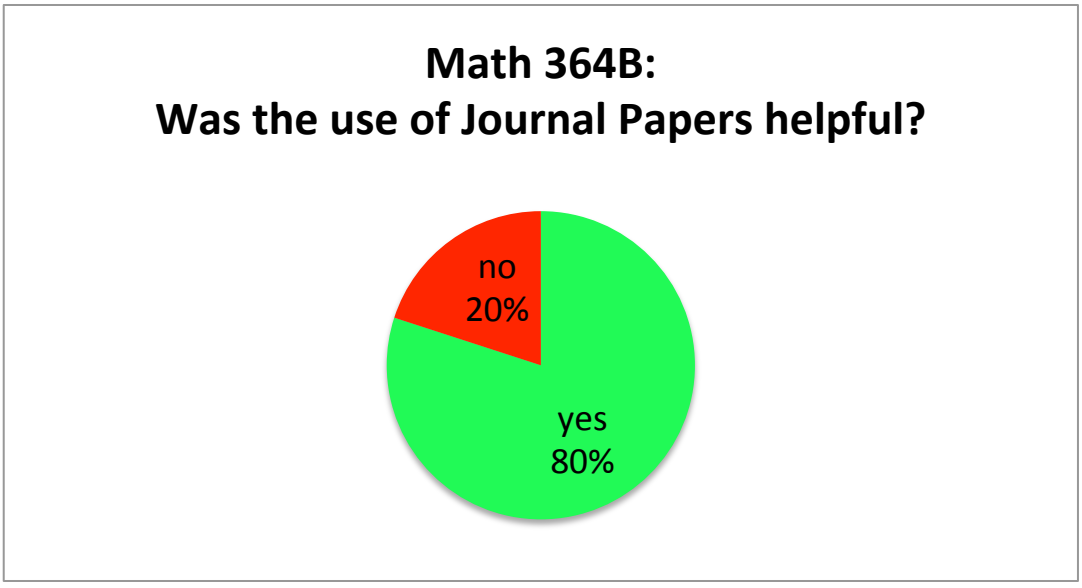


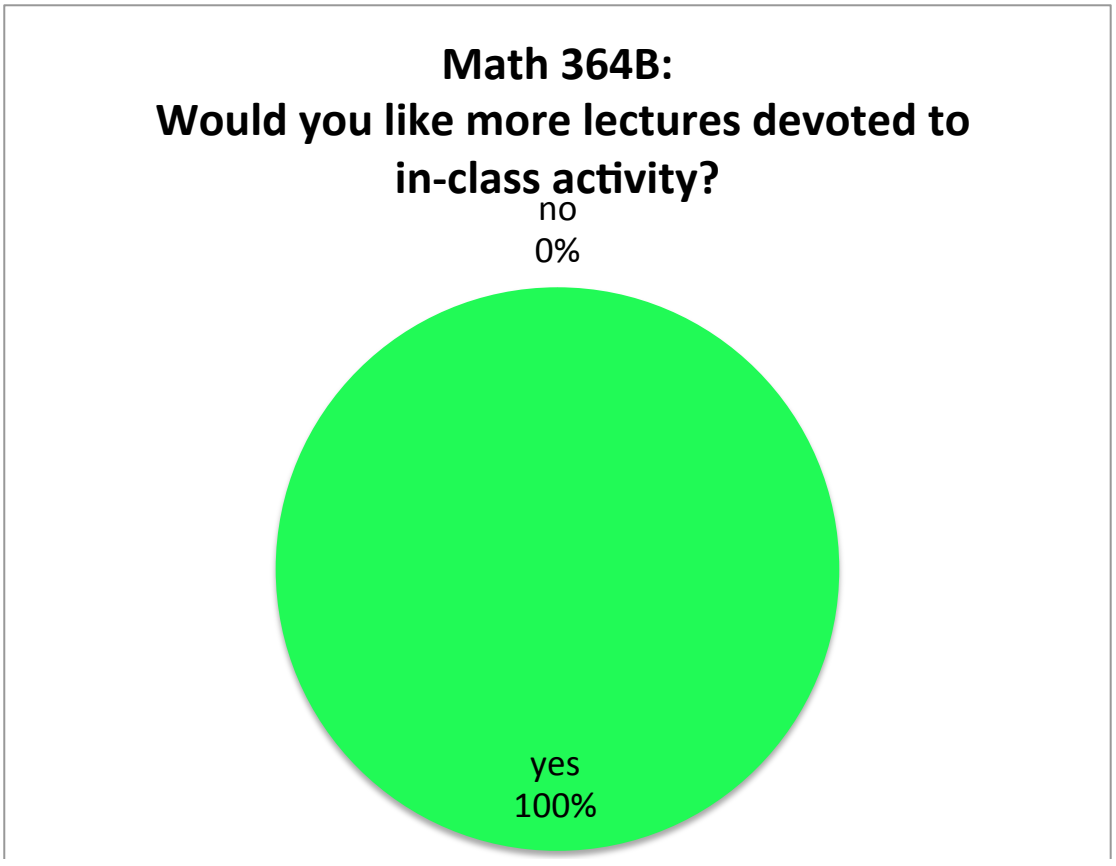



0
yes
no

Math 364B 10 out of 32 responded.

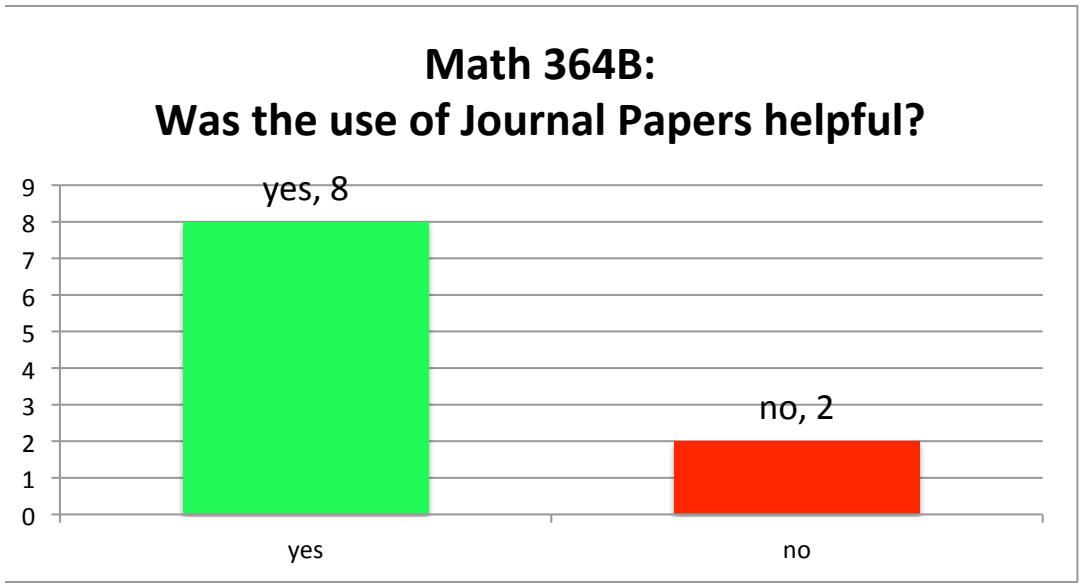
Was the use of Journal Papers helpful?		Would you lik
yes	8	yes
no	2	no

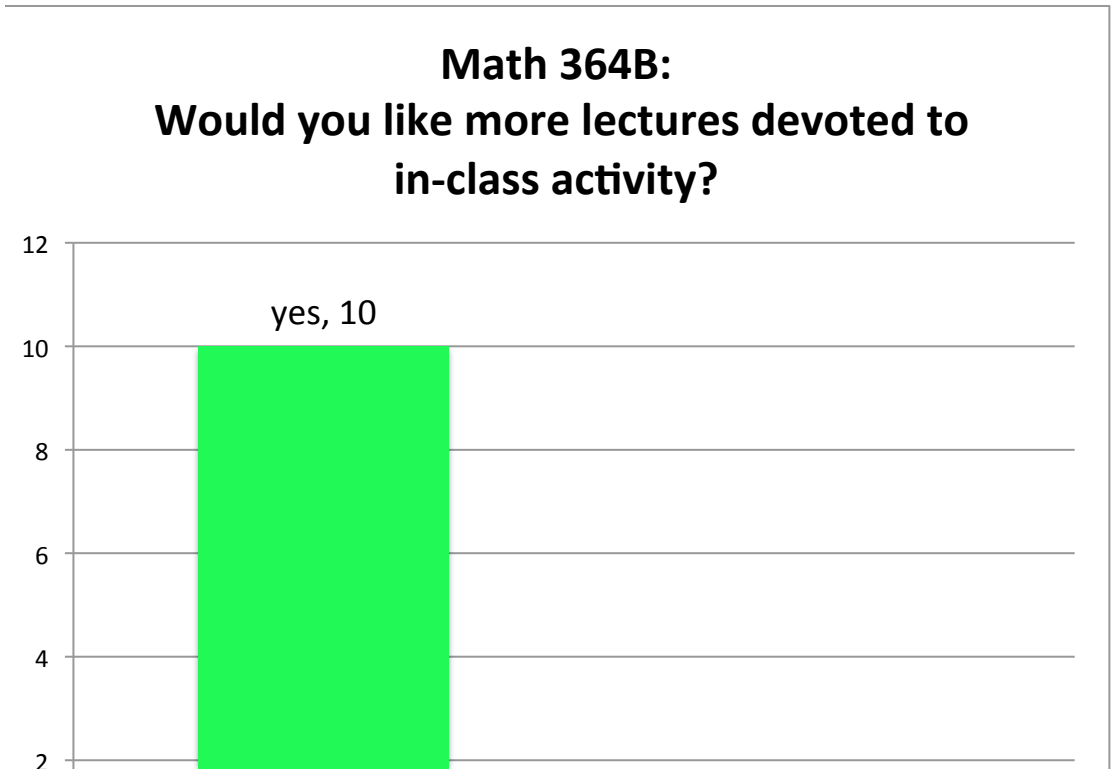




ke more lectures devoted to in-class activity?

	10
	0






0
no, 0
yes
no

I tried two new ideas:
1) Business Calculus Large Lecture - 120 mostly freshman students in PH1-141 - incorporated much more i-clicker interaction. I increased from 5 min to 15 min a lecture. I cut out doing redundant sample exercises, the class did those via i-clicker.

2) Ordinary Differential Equations 2 (second class in the subject) - 30 upper division math majors - I incorporated reading and extending the results of two papers into the course. I devoted 2 class periods for in class work only; 3 min of intro setup, the rest of the time they worked on a problem (a simplified version of the problems in the papers), and I devoted 5-10 min a class for them to work out details in the lecture before proceeding.

The first experiment I deem a success, the students were talking among themselves, sharing answers and methods to answers. There was quite a bit of movement over the semester as groups formed and started to sit next to one another. I was able to cover the same material, just not as many examples. After grades were posted, I queried the class with “Was the use of iclickers helpful?”. I had 33 out of 96 respond: 23 Yes, 10 No. Reading the comments, I will add (even more) time to each clicker question when I run the class next time. I gauged the time by giving a 1 minute warning after 3/4 of the class had responded. I will push it to 5/6 or so next time.

Representative “Yes" responses:
"You have incentive to do the work because of the points and they get you to engage your neighbors as well. Definitely a satisfied yes."
"I believe it is a nifty way to keep the class from becoming a straight lecture. Some students even got together to solve the problem given over a short time period. Only drawback is time limit, but considering that lecture is being given within a time constraint - I guess the time given to discuss and work on the iclicker problems is reasonable. “
"To a certain extent. It forces the students to actively participate but it was stressful that I would rarely get the question correct.”

Representative “No" responses:
"I found the clicker system pointless."
"I usually didn't understand how to do the question by the time you had us do it for iClicker points, so I ended up getting them wrong a lot of the time."

The second experiment I also consider a success. There emerged groups of 3-5 that shared information with each other. Shifting the symbol pushing part of lecture to the class meant I had to cut some content. The reading of the journal papers wasn’t explicitly tested, so after grades were posted I queried the class

with "Did you find the use of journal papers helpful? Would you like me to have more lectures like the one where we did the in-class exercise?" I received 10 responses out of 32 in the class. Journals helpful : 8 Yes, 2 No. More in-class: 10 Yes. Based on the responses, I will devote at least 3 more lectures to in-class activity (so about 1 out of 4 lectures are class activity)

Representative Journal "Yes" responses:
"I think that these examples are very interesting especially with regards to understanding the trends in the Iwo-jima graphs, however the journals were a little difficult to decipher. However that didn't minimize the amount of help they provided with making sure that we got a similar answer to what was in the journal."
"I very much enjoyed the lectures and exercises based on the journal papers. The real world applications of the material covered is not something I have encountered much while at CSULB. It took me a little while to get used to your teaching method but I think the way the class was taught provided the proper tools not only to analyze a problem but also recognize how and where different tools could be used. More math classes should be taught this way."

Journal "No" responses:
"For the reasons that I'm taking the class, no it was not helpful to me. I just wanted to pass. I was expecting 364B to be like 364A where you learn to apply different methods to solve for ODES."
"I personally couldn't understand most of what was going on in the papers, so it didn't help me that much…"

Representative "Yes" response to having more in-class work:
"The in-class exercise was also awesome in that it was an hour of solid critical thinking about our problems with helpful peers (which is a hard thing to coordinate outside of class)."

William Ziemer
Dept. of Mathematics and Statistics
CSULB
wziemer@csulb.edu